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Original Contributions.

UNDERLYING FACTORS OF DEVELOPMENTAL PATHOLOGY.

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Since in the evolution of organs certain parts disappear, and in the evolution of organisms certain organs are sacrificed through suppressive economy, since also the disappearing and developing tendencies necessarily center around the time when functions are to be lost by the disappearing and others gained by the developing, periods of stress occur Around these the law of economy of growth centers the struggle for existence between parts of organs themselves (Kiernan, *Medicine,* 1901), and because of this fact physiologic atrophies and hypertrophies and their reverse occur. Almost every physiologic disturbance may result at these periods of stress from the influence of maternal nutrition or environment or hereditary factors.

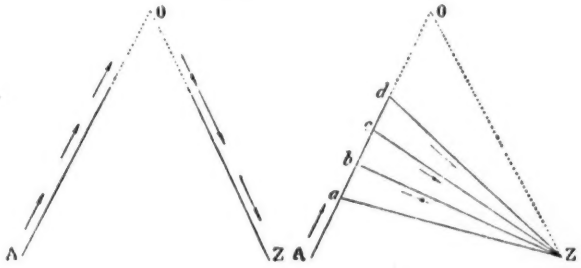
Because of the reverse phase of physiologic atrophies and hypertrophies, Morgan and Legrain made the true but too positive assumption that degenerates are abnormal because of the inability to reacquire progressive powers of primitive ancestors. There are here two factors independent of the enormous one of environment to be considered—the impetus given nutrition toward the degenerating hypertrophied organ and the impetus of nutriment from the atrophied organ. For this reason retrogressive evolution involves more than the simple retracing steps. These elements are illustrated in the diagrams of Morgan and Legrain. The ascending lines represent the progressive evolution of an organ or institution; the descending lines represent the degenerative or suppressive evolution. From the point a, representing the primitive condition, progressive evolution passes toward o, an imaginary perfect condition of the organ. Along the upward line, however, the points a, b, c, d, etc., represent obstacles to further progress—that is to say, factors

tending towards degeneration. From these points lines of degeneration pass towards z, and the condition at z, although representing that at a, is not indentical with a, and is not reached by a sliding backwards down the line o-a. Thus, while most recently acquired features tend to disappear first, degeneration is not a complete retracing of steps until the point of departure is reached.

The obstacles to further progressive evolution, or causes which underlie developmental pathology (degenerations or arrests of development), are, in the order of their severity, excesses of all kinds, including those in toxic agents, contagious and infectious diseases, heredity, consanguineous and neurotic marriages, school strain, or neurasthenia from any cause in parents. As these causes have been discussed in my various productions (Degeneracy: Its Causes, Signs and Results. Irregularities of the Teeth. Interstitial Gingivitis or So-called Pyorrhea Alveolaris) they will not be considered in detail here. Agencies which produce neurasthenia or fagged-out nervous systems are divisible into the following groups: those embracing condiments, medicines, foods and beverages, those arising from occupations and excessive indulgence, and those from resultant worries and uncertainties.

Tobacco is the most common, while alcohol and opium contend for second place both as to use and deleterious effects. Alcohol has been repeatedly charged with being the greatest factor in degeneracy. The influence of alcohol on the individual must first be studied to determine its potency and method of action as a cause of race deterioration. Careful medical researches have shown that alcohol produces a nervous state closely resembling that induced by the contagions and infections, and often accompanied by mental disturbance. The acute nervous state to which the term "alcoholism" was applied by Magnus Huss has all the essential characteristics of the nervous state due to the contagions and infections or mental exhaustion. The action of alcohol may be limited to the central nervous system and thus produce hereditary loss of power. It may cause changes or degeneracies in the peripheral nerves which in the offspring find expression in spinal cord and brain disorder through extension of the morbid process. But for its deteriorating effects on the ovaries and testicles alcohol would be a most serious social danger. Through these, however, it tends to prevent the survival of the unfit rather than to develop degeneracy.

Opium seems to be the Charybdis on which the human bark strikes when escaped from the Scylla of alcohol. Its abuse as a narcotic is much older than is generally suspected even among the English-speaking races. Murrell over ten years ago demonstrated that the inhabitants of the Lincolnshire fens had long employed opium as a prophylactic against malaria. The ratio of insanity in these regions proved to be very great. The same conditions obtained in certain malarial regions of New Jersey and Pennsylvania, where the use of strong infusions of the poppy was common. The statistics of Rush (Observations on the Brain and Mind. Page 10, 1798) as to opium-caused insanity in Pennsylvania indicate that the percentage of American opium abuses at the beginning of the nineteenth century was very great. The drug differs in two impor-



tant aspects from alcohol—it is nearer in chemical composition to nerve tissue, and the tendency to its use may be transmitted by the mother directly to the fetus, since it passes through the placenta very often unaltered. Opium is a more dangerous factor of degeneracy than alcohol, since the opium habitué must be in a continuous state of intoxication to carry on his usual avocation, while abstinence from alcohol is perfectly compatible with proper work on the part of the alcoholist. The opium habit is increased by the propaganda carried on by the habitués, who justify their position by urging the use of opium for any ailment, however trifling. Opium like alcohol causes nervous exhaustion similar to but greater than that of the contagions and infections. From the affinity of opium to nerve tissue; from its tendency to stimulate the heart, thus causing increased blood supply to the brain; from its action on the bowels and the increased resultant work of the liver, this nervous state is much intensified. Opium does not interfere with the structure and

fecundation of the ovary and testicles like alcohol, hence the danger of the opium habitué's children surviving. Opium when smoked stimulates the reproductive apparatus and thus greatly increases the number of degenerates due to this habit, although the defects due to the inheritance of the habit and their consequences lessen survivals.

With tobacco, as with alcohol and opium, the statistic method generally proves fallacious when applied to degenerative effects. The most careful researches show that the typical effects occur as a rule after long continued use of tobacco, sometimes not until twenty years or more. While many smokers reach old age, many fail to live to old age because they are smokers. The skin is subject to itching and reddening; the nerves of taste are blunted and patches develop in the throat; loss of appetite, epigastric fulness, pain, vomiting and disturbance of bowel function are common. Menstrual disturbance occurs in women, and in female cigar-makers abortion and pluriparity are frequent. The sexual appetite is impaired, and sometimes sterility and impotence occur. Disturbed heart action, palpitation, rapid and intermitting pulse, precordial anxiety, weakness, faintness and collapse, with sclerosis of the coronary arteries of the heart and left ventricular hypertrophy occur often. Cigars and cigarets produce irritation of the nose and mucous membrane, diminished smell, chronic hyperemia of the epiglottis and larynx, and sometimes of the trachea and bronchi, predisposing to tubercular infection. Nicotine amblyopia is common, with central disturbances of the field of vision and slight color blindness. Often there is disorder of the ear tubes and congestion of the drum, with loss of auditory power and consequent noises in the ear. The central nervous system is affected. In high schools non-smokers progress faster than smokers. Child smokers from nine to fifteen years of age exhibit less intelligence and more laziness or other degenerative tendencies. Adults have head pressure, sleeplessness or drowsy stupor, depression, apathy and dizziness. There may also be ataxic symptoms, paretic weakness of bowels and bladder, trembling and spasms. Tobacco insanities, though comparatively rare in smokers, are common in snuffers and still more so in chewers. (Annual of the Universal Medical Sciences, 1895). In the precursory stage, which lasts about three months, there are general uneasiness, restlessness, anxiety, sleeplessness, and mental

depression, often of a religious type. After this occurs precordial anxiety, and finally the psychosis proper, consisting of three stages: 1. Hallucinations of all the senses, suicidal tendencies, depression, attacks of fright, with tendency to violence and insomnia. 2. Exhilaration, slight emotional exaltation, with agreeable hallucinations after from two to four weeks' relaxation, again followed by excitement. 3. The intervals between exaltation and depression diminish, and the patient becomes irritable, but otherwise not alive to his surroundings. Perception and attention are lessened. The patient may be cured in five or six months if he stops tobacco during the first stage. In a year or so he may recover during the second stage. After the third stage he is frequently incurable. As the patient often becomes (especially by the use of the cigaret) an habitué before puberty, the proper development and balance of the sexual and intellectual system is checked. These patients break down mentally and physically between fourteen and twenty-five. The moral delinquencies, other than sexual, are often an especial tendency to forgery and deceit of parents. Frequently the insanity of puberty (hebephrenia) is precipitated by tobacco. The cigaret if used moderately may be a sedative, but as used is a stimulant, and is often made of spoiled tobacco, resembling in reaction morphine, and acting on animals in a somewhat similar manner. As tobacco turns the salivary glands into excretory glands, it leads to imperfect digestion of starch and to consequent irregular fermentation in the bowels, thus at once furnishing a culture medium for microbes, from which to form more violent toxins, and likewise creating leucomaines, to damage a nervous system overstimulated by nicotine. This is one great reason why those who use snuff and chew tobacco become insane more frequently than smokers, albeit these last are not exempt.

Statistics from the female employes of the Spanish, French, Cuban and American tobacco factories, while defective and somewhat vitiated by the coexistence of other conditions producing degeneracy, support the opinion that the maternal tobacco habit (whether intentional or the result of an atmosphere consequent on occupation) is the cause of frequent miscarriage, of high infantile mortality, of defective children, and of infantile convulsions. Tobacco, therefore, in its influence on the paternal and maternal organism, exhausts the nervous system so as to produce an acquired transmissible neurosis.

Professional tea-tasters have long been known to suffer from nervous symptoms. Very early in the practice of their occupation the head-pressure symptoms of neurasthenia appear. Tremor also occurs early. While changes in the optic nerve have not been demonstrated beyond a doubt, still eye disorders have been observed in the pauper tea-drinkers of the United States and in the tea-tasters of Russia, indicating similar changes to those produced by tobacco and alcohol. The tea-cigaret habit has these effects. Bullard (Annual of the Universal Medical Sciences, 1889) finds that tea has a cumulative effect. In his experience toxic effects are not produced by less than five cups daily. The symptoms manifested are those of nervous excitement resembling hysteria, at times almost amounting to fury; nervous dyspepsia; rapid irregular heart action; heart neuralgia; helmet-like sensation and tenderness along the spine. James Wood of Brooklyn (*Ibid.* 1895) found that ten per cent of those under treatment at the city hospitals exhibited similar symptoms. Of these sixty-nine per cent were females, and every symptom ascribed by Bullard to tea was seen by Wood in his cases, who also found that the women manifested irregularities in menstruation of neurasthenic or hysterical type. He found that these symptoms were produced by one-half of the quantity of tea charged with these effects by Bullard. The *Lancet* several years ago, from an editorial analysis of the effects of tea-tippling, took the position that in no small degree nervous symptoms occurring in children during infancy were due to the practice of the mothers both of the working and society class indulging in the excessive use of tea, the excess being judged by its effects on the individual and not by the amount taken. Convulsions and resultant infantile paralysis were frequently noticed among the children of these tea-tipplers. Observations among the factory population and the workers in the clothing sweat-shops show that tea neurasthenia, presenting all the ordinary symptoms of nervous exhaustion, is especially common. It is evident that tea produces a grave form of neurasthenia readily transmissible to descendants. In addition to its effects directly upon the nervous system, tea tends to check both stomach and bowel digestion, and this increases the self-poisoning which is so prominent a cause, consequence and aggravation of these nervous conditions.

Coffee exerts an action very similar to that of tea, although the

nervous symptoms produced by it are usually secondary to the disturbances of the stomach and bowel digestion. Coffee produces tremor, especially of the hands, insomnia, nervous dyspepsia and helmet sensations. With the exception of certain districts of the United States coffee abuse is not carried to such an extent as tea, albeit in these, as in some portions of Germany, the habit is an excessive one. The conditions described result in Germany as frequently as they do in the United States. Mendel (*Neurologisches Centralblatt* 1887) finds that in Germany coffee inebriety is increasing and supplanting alcohol. Profound depression with sleeplessness and frequent cortex headache are early symptoms. Strong coffee will remove these temporarily, but it soon loses its effect and they recur. The heart's action is rapid and irregular, and nervous dyspepsia is frequent. L. Bremer of St. Louis has observed similar conditions among both Germans and Americans there.

While coca took its place but recently among the toxic causes of degeneracy, it was a factor of Peruvian degeneration long ere the discovery of America. Forty-three years ago (Johnson, Chemistry of Common Life, Vol. II.) Europeans or people of European origin in different parts of Peru had fallen into the coca abuse. A confirmed chewer of coca, called a coquero, becomes more thoroughly a slave to the leaf than the inveterate drunkard is to alcohol. Sometimes the coquero is overtaken by an irresistible craving and betakes himself for days together to the woods and there indulges unrestrainedly in coca. Young men of the best families of Peru are considered incurable when addicted to this extreme degree, and they abandon white society and live in the woods or in Indian villages. In Peru the term "white coquero" is used in the same sense as irreclaimable drunkard. The inveterate coquero has an unsteady gait, yellow skin, quivering lips, hesitant speech and general apathy. The drug has assumed an unusual prominence in the field of degeneracy since the discovery of its alkaloid, cocain. In both Europe and the English-speaking countries the world over a habit has resulted which, while much overestimated, is undoubtedly growing and aggravating as well as producing degeneracy. Many of the cases reported as due to cocain are, however, chargeable to the craving of the hysteric or neurasthenic to secure a new sensation, or the desire on the part of the opium or whisky fiend to try a dodge for forgiveness by friends. The habit is very frequently induced

by patent medicines taken to cure catarrh by the neurasthenic or to cure nervousness by hysterics as well. As deformities of the nose passages predispose to "catarrh," patent medicines for local application containing cocain are frequently employed in the treatment of this supposed constitutional disease, with the result of aggravating the original degeneracy. The youth under stress of puberty frequently ascribes all his ills to catarrh, and for it often employs snuffs containing cocain, and his nervous condition is much aggravated thereby. Among the nostrums urged in the newspapers and magazines for this condition so often resultant on nerve stress alone is a snuff containing three per cent of cocain. From the description given by Johnson of the coquero there can be no doubt that tramps, errabund lunatics and paupers result from this habit to give birth to degenerates in the next generation.

Lead produces in those exposed to its fumes a systemic nervous exhaustion, characterized by local paralysis about the wrist, as well as the general symptoms of profound systemic nerve tire. This may result, as was pointed out nearly half a century ago (Tanquerel des Planches, Lead Diseases, American Edition, 1848), in acute insanity of the confusional type followed very often by mental disorder of a chronic type resembling paretic dementia. In some cases the patient recovers from the acute insanity to suffer thereafter from epilepsy. In other cases (Kiernan, Journal of Nervous and Mental Diseases, 1881) an irritable suspicional condition also results, in which the patient may live for years, marry and leave offspring. This last condition and the epileptic are the most dangerous as to the production of degeneracy. The women employed in the pottery factories in Germany suffer, according to Rennert (American Journal of Obstetrics, Oct., 1882), from a form of lead-poisoning which produces decidedly degenerative effects upon the offspring. These women have frequent abortions, often produce deaf-mutes and very frequently macrocephalic children.

Brass-workers suffer from a nervous condition very similar to that produced by lead. Hogden (Birmingham Medical Review, Jan. 1887) of Birmingham and Moyer (Medicine, May, 1904) have called attention to the grave forms of nervous exhaustion produced among brass-workers. The period during which the patient is able to pursue the occupation without breaking down is longer than that of the lead-workers. Women, like men, are exposed to

this condition. The chief effects produced, so far as the offspring have been observed, are frequent abortions and infantile paralysis.

The occupations exposing to mercury, whether mining, mirror-making or gilding, produce forms of systemic nervous exhaustion in which the most marked symptom (but less important from a sanitary standpoint) is a tremor amounting at times almost to the shaking palsy. Like all other systemic nervous exhaustions, the mercurial one may appear as degeneracy in the offspring. The employment of women in match factories and tenement-house sweat-shops is growing. The chief toxic effect of phosphorus is not the localized jaw necrosis. This is but an evidence of the progressive system saturation with phosphorus, and bears the same relation to the more dangerous effects of phosphorus that "blue gum" does to the systemic effects of lead.

Every condition of toxic origin capable of producing profound systemic nervous exhaustion in the ancestor, and especially in the ancestress, may induce degeneracy in the descendant. With the growing tendency of woman to pass from the ill-paid work of the seamstress to the better paid but dangerous occupations, a certain seeming increase in degeneracy must result.

The influence of contagious and infectious diseases upon developmental pathology or suppressive evolution is by no means slight. Any disease that produces grave constitutional defects in the parent is likely to be intensified in the offspring. The greatest social dangers result from tuberculosis; the next from syphilis. Typhoid fever, scarlatina, small-pox, measles, diphtheria, whooping-cough, and all contagions, however, may produce these constitutional defects, either through the pregnant mother or through their secondary effects on the ancestor's constitution. If the subject be attacked before the close of the periods of dental stress, an arrest of development of the bones of the face may result, with irregularities in the shape and position of the teeth. These then are stigmata of degeneracy especially due, in the individual presenting them, to the contagions and infections rather than to inheritance alone.

Two agencies producing profound constitutional alteration in a victim, which predispose to degenerative factors like alcohol and which increase the effect of these are, as Kiernan (Journal of Mental and Nervous Disease, 1881) pointed out nearly a quarter of a century ago, traumatism and isolation. There is a deep-seated

neurosis produced by these, attended by a suspicional state, and accompanied with metabolic changes which result in glycosuria, and which aggravate the coexistent neuroses. The influence of these states on the offspring I have elsewhere (Degeneracy, Its Causes, Signs and Results) pointed out in their relation to the effect of alcohol.

The relations of heredity are far more intricate than is usually assumed to be the case in the average discussion of the subject. The problem consequent on impregnation is not that involved in the mere carrying of the mixture of parents in a fully developed form through intrauterine life. Impregnation moreover depends on the preparation of the ovum for the spermatozoon. The centrosome (a body belonging to the period when the ovum has passed from the parthenogenetic to the primitive hermaphroditic stage) has to disappear ere its quasi-function is assumed by the spermatozoon. Furthermore, when the germinal streak has occurred this must be preserved from duplication tending to make duplications of cells or organisms or other minor manifestations of the conditions resultant in double monsters. As all vertebrate organs pass through the same stages before definitely differentiating, the later types have to gain at the expense of the earlier and hence must receive greater energy from the direct ancestors. The want of this energy is shown in the various defects and departures from type which occur in the different degeneracies and congenital defects. For this reason the descendants of a victim of morbidity or abnormality do not always exhibit the disorders or not to the same degree. Sometimes the superior strength of the maternal ancestor and her consequent power of nourishment carry the fetus through the period of defect shown by the father and consequently correct that defect. The types of heredity ordinarily considered are direct heredity where the individual takes after immediate ancestry, and type heredity where he takes after the type to which he belongs. Concerned in this latter is atavism or reversional heredity, where the individual throws back to immediate remote ancestors. This element of atavism tends, through preserving the type, to offset the defects of immediate heredity and, indeed, often underlies the apparent differences between children of the same parents. It likewise prevents equal inheritance from both parents, and sometimes favors inheritance of strength or defect from either. It underlies also so-called

collateral or indirect heredity and the transmutation of heredity. While acquired defects and benefits may be, as even Weismann (Germ Plasm, page 431, 565) admits, inherited this can occur but rarely, since it not only implies weakness of atavism or type heredity, but likewise weakness of maternal constitution and environment during pregnancy and lactation. Much of the alleged inheritance of paternal defects is due to the environment of the mother produced by this defect, as I have elsewhere (Degeneracy, Its Signs, Causes and Results) pointed out in the discussion of the influence of paternal alcoholism. What is true of alcoholism is of course true of all other degenerative factors. The neurasthenic influence of these on the maternal organism during pregnancy and lactation would through simple arrest of maternal functions create defective offspring even were there no direct inheritance of defect.

Manifestations of morbid heredity may not be inheritance of the whole effect but disturbance of relations of structure and hence of function, producing a constitutional deficiency which takes the line of least resistance. The extent and direction of this line of least resistance depends upon the amount of healthy atavism which separate organs and structures of the body preserve. What is true of the organism as a whole is true of the cells forming its organs. While cell life is altruistic or subordinated to the life of the organ and through it to the life of the organism as a whole, still this altruism is not so complete as to prevent entirely a struggle for existence (Roux, Der Kamp der Theile im Organismus) on the part of the cells or the individual organs. With advance in evolution this struggle decreases to increase with the opposite procedure of degeneracy. From it result the phenomena of arrested and excessive development. This struggle for existence was very early pointed out by Aristotle (Osborn, From the Greeks to Darwin), who showed that one organ was often sacrificed for the development of another. This was more clearly pointed out and freed from obscurity by Goethe in 1807 and St. Hilaire in 1818. The law under which this struggle operates is known as the law of economy of growth. Its action sometimes aids, and sometimes, when regular, prevents degeneracy. The vertebrate embryo of the higher type has in it all the potentialities for the organs and structures found in lower types. As ancestry is strengthened these potentialities remain latent. In proportion as the ancestry becomes subject to nervous

exhaustion these potentialities gain nutrition at the expense of the later acquired organs which are the ones likely to be affected by nervous exhaustion. All the organs of the body have practically their own nervous system, which exercises a control over their nutrition through its control over the blood supply and the means of excretion. The excessive action of this local nervous system is regulated by the central nervous system for the benefit of the organism as a whole. Should the central nervous system become weakened the local nervous system is given free play, and first draws greater nourishment and increased power at the expense of other organs. As a result of this increased power the local nervous system becomes itself exhausted and a struggle for existence occurs between its parts. In consequence, as in the case of tumors and cancers, cells take on the power of reproduction which for a long time they had lost for the benefit of the organization as a whole (Degeneracy, Its Signs, Causes and Results). This struggle for existence produces effects which are handed down by heredity or are fought by atavism. These two factors in heredity may play beneficial as well as injurious parts on the offspring. As a rule atavism plays a beneficial part in correcting degenerate tendencies. This part may either be complete in the shape of a perfect return to a normal ancestor or may be so incomplete as to moderate in the offspring the effect of an extended nervous exhaustion of an immediate ancestor.

Consanguineous and neurotic marriages are fruitful sources of degenerate children. Accentuation of family characteristics must always happen from consanguineous marriages, for if there be taint in the family each member will have inherited more or less of it from the common ancestor. Cousins who are descendants of a common grandparent who was insane and of an insane stock inherit more or less of the insane diathesis. Even if the taint has been largely diluted in their case by the wise or fortunate marriages of blood-related parents, they have still inherited a neurotic tendency. If they marry they must not be surprised if that taint appears in aggravated form in their children. Children of such parents may be idiotic, epileptic, dumb, or lymphatic, and the parents marvel whence came the imperfection. In some cases the parents and possibly the grandparents of the unfortunate children have not displayed any obvious evidence of the tendency to disease which they have inherited and handed on to their descendants. Not looking

farther back, the parents boldly assert that such a thing as insanity, epilepsy, scrofula, etc., is unknown in their family. They themselves have never been insane, why should their children be? In like manner children may be epileptic, blind, deaf-mute, lymphatic, cancerous, criminal, drunkards or deformed from direct inheritance and yet the family line be honestly declared healthy. The truth of Sir William Aitken's maxim that "a family history including less than three generations is useless and may even be misleading" is hence obvious. Similarity of temperament induced by a common environment, which Strahan calls "social consanguinity," is also a potent factor in degeneration. Living under similar customs, habits and surroundings, laboring at the same occupations, and indulging in the same dissipation, tend to engender like diseases and degenerations irrespective of blood relationship. Persons not even distantly related by blood are in reality much more nearly related in temperament than cousins or even nearer blood relations who have experienced widely different modes of life. This "social consanguinity" is the great curse which dogs every exclusive tribe and class and hurries them to extinction. It has largely added to real or family consanguinity in the production of the disease and degeneration which have fallen so heavily upon the aristocracies and royal families of Europe. This "social consanguinity" appears likewise in the tendency of the neurotic to intermarry, popularly expressed in the proverb that "like clings to like." This marital likeness in mental characteristics has been shown to be present by Roller, de Monteyel, Kiernan, Bannister and Manning so far as Germany, France, the United States and Australia are concerned.

School-strain evinces itself in a systemic nervous exhaustion manifested along lines of least resistance. The first types of neuroses are due to overstrain of certain territories related with memory as contrasted with diminished use of the association fibers connecting these. In degenerate children, because of deficiencies of proper interassociation of the memory territories in the brain, healthy curiosity and the instinct of sheltering are deficient, so that states of uncertainty, producing terror, result. These become permanent in after life, even when training as adults is strongly antagonistic to them. Overpressure in school in certain respects checks, even in well-developed minds, the transition from the terror of the unknown of childhood into the calm of maturity. Morbid fears, imperative

conceptions, and imperative acts which torture the individual during an otherwise healthy career unquestionably originate in the early periods of life.

Degenerate children, as Kiernan remarks, early manifest decided neurotic excitability and tend to neuroses at physiologic crises like the first and second dentition and the onset and close of puberty. Slight physical or mental perturbation is followed by sleeplessness, delirium, hallucinations, etc.; hyperesthesia and excessive reaction to pleasant or offensive impressions exist; vasomotor instability is present, and pallor, blushing, palpitations or precordial anxiety result from trivial moral or physical excitants. There is no precocity or aberration of the sexual instinct. The disposition is irritable. Psychic pain arises from the most trivial cause and finds expression in emotional outbursts. Sympathies and antipathies are equally intense. The mental life swings between the periods of exaltation and depression, alternating with brief epochs of healthy indifference. Egotism is supreme and morality absent or perverted, and the latter condition is often concealed under the guise of moral superiority, religiosity or cant. Vanity and jealous suspiciousness are common, and the intellect and temper are exceedingly irregular. Monotonously feeble, scanty ideation passes readily into seeming brilliance, even to the extent of hallucinations, but ideas are barren as a rule, because generated so rapidly as to destroy each other ere they pass into action. Energy fails ere aught can be completed. The inability to distinguish between desires and facts produces seeming mendacity. The will in its apparent exuberance, its capricious energy and innate futility, matches and distorts the one-sided talent or whimsical genius which may exist. The whole of this mental state may not be present. The tendency to introspection, to morbid fear, to gloom, to hallucinations, to alternations of depression and exaltation, may occur in a degenerate child in whom has been otherwise preserved that secondary ego which is the latest and greatest acquirement of the race.

Among the signs of fatigue in children is the slight amount of force expended in movement, often with asymmetry of balance in the body. The fatigued centers may be unequally exhausted; spontaneous finger twitches like those of younger children may be seen, and slight movements may be excited by noises. The head is often held on one side; the arms when extended are not held horizon-

tally, and usually the left is lower. The face is no evidence of bodily nutrition, as it may be well nourished, yet the body be thin. Three per cent of the children seen in school are below par in nutrition, and these children are of lower general constitutional power. They tend to an ill-nourished condition under the stress of life and many cases of mental excitement which, while rendering them sharper mentally, militate against general nutrition.

School strain produces, like all the acquired factors of degeneracy, a systemic nervous exhaustion which may be expressed either in general neuropathy or hysteria after puberty or in the tropho-neuroses, like gout and allied states, or in epilepsy or arterial change, predisposing to rupture of arteries at periods of stress, with resultant convulsions and paralysis.

Nothing does so much to bring about degeneracy as the exhausting social functions undergone by young women just before marriage. Brides become so exhausted that they can hardly stand at the altar. Women in nourishing their children cannot only overcome their own defects but likewise those of their husbands. It is therefore better for a prospective bride to isolate herself and rest rather than undergo the stress of social functions in celebration of her approaching marriage. Few women under existing methods of life can rear a large family destitute of mental and physical defect. The same was equally true of past centuries, whence the congenitally defective ancestors of the present generation.

Neurasthenia in the parents from all the conditions herein enumerated affects pathologically the development of the child. This implies a practical degeneration in function, since tone is lost.

Every nerve cell has two functions, one connected with sensation or motion and the other with growth. If the cell be tired by excessive work along the line of sensation or motion the function as regards growth becomes later impaired, and it not only ceases to continue in strength but becomes self-poisoned. Each of the organs (heart, liver, kidneys, etc.) has its own system of nerves (the sympathetic ganglia) which, while under control by the spinal cord and brain, acts independently. If these nerves become tired the organ fails to perform its function, the general system becomes both poisoned and ill-fed, and nervous exhaustion results. In most cases, however, the brain and spinal cord are first exhausted. The

nerves of the organ are then allowed too free play and exhaust themselves later. This systemic exhaustion has local expression in the testicles in the male, in the womb and ovaries in the female. Because of this condition the body is imperfectly supplied with the natural antitoxins formed by the structures; the general nervous exhaustion becomes more complete, and all the organs of the body are weakened in their functions. Practically the neurasthenic in regard to his organs has taken on a degenerative function, although not degenerating in structure, since the restlessness of the organs is a return to the undue expenditure of force which occurs in the lower animals in proportion as it is unchecked by a central nervous system. Through the influence of various exhausting agencies the spinal cord and brain lose the gains of evolution and the neurasthenic is no longer adjusted to environment. Since the reproductive organs suffer particularly, children born after the acquirement of nervous exhaustion, more or less checked in development as the influence of atavism is healthy or not, repeat degenerations in the structure of their organs, which in the parent were represented by neurasthenic disorders in function. As the ovaries of neurasthenic women generally exhibit prominently the effects of the nervous exhaustion, the disappearance of the centrosome is not properly effected and sufficient stimulus by the spermatozoon is not secured, and the offspring of these do not gain enough vigor to pass through the normal process of development.

ILLUSTRATIVE TALK ON ORTHODONTIA.

BY M. N. FEDERSPIEL, D. D. S., RACINE, WIS. READ BEFORE THE SOUTHERN WISCONSIN DENTAL ASSOCIATION, AT JANESVILLE, JUNE 8-9, 1904, AND BEFORE THE WISCONSIN STATE DENTAL SOCIETY, AT MANITOWOC, JULY 19-21, 1904.

My plan is to give you an illustrative talk on orthodontia, and show you the results achieved during the time I have devoted to the practice of this grand science. Orthodontia as taught in the average dental college is a disappointment, as it gives the student but a faint idea of the importance of this branch of dental science when he enters upon his professional career. Inability to realize the necessity of regulating the teeth during early childhood, ig-

norance of the phenomena of occlusion, observance of the pernicious teachings that the treatment for malocclusion should be deferred until all of the permanent teeth have erupted, belief in the absolute theory that nature will provide room and adjust the teeth in their proper positions, all point to the fact that the average dental student has not studied and mastered the forces governing occlusion.

The fact that the alveolar process develops only sufficiently to

FIGURE 1.

accommodate the teeth, no matter in what position we may find them, demonstrates that the jaws are not enlarged sufficiently to allow the teeth to adjust themselves in proper positions. When the teeth erupt and take their positions in the arch, their cusps passing into the inclined planes of the opposing cusps, mesio-distal relation is established and we have normal occlusion. If, however, one tooth passes beyond the inclined plane of the opposing tooth, the former is not only in mal-position, but has a tendency to destroy the normal movement of the following teeth, so that there is progressive malocclusion during the period covering the eruption of

the teeth. If the teeth are neglected at this time they will often assist in causing a more pronounced case of irregularity, bringing about destruction of the facial lines, improper mastication, breathing, etc.

Figure 1 represents the teeth in ideal normal occlusion. Each arch has a graceful curve. It is what I would call a perfection of form, as the teeth of each arch are so perfectly arranged as

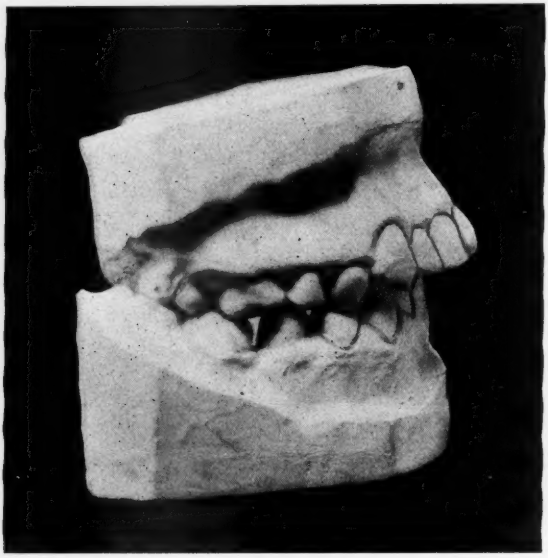


FIGURE 2.

to be in harmony with their fellows. Nature arranged the teeth in that position so as to permit performance of their functions properly. This picture illustrates that each and every tooth is of great value in preserving harmony of the jaws. Hence the extraction of one or more teeth for the correction of malocclusion is not only wrong, but has a tendency to inhibit the advancement of orthodontia.

Figure 2 shows the results of extracting the two lower first molars when the patient was nine years old, causing the lower second

molar to move mesially and to tip forward, so that the distal cusp only occludes with the opposing teeth, while the bicuspids and incisors move distally sufficiently to give the patient the appearance of suffering from a pronounced superior protrusion. In treating this case I extracted one upper biscuspid on either side so as to establish a more harmonious relation of the teeth.

Figure 3 shows the results after treatment. While the patient

FIGURE 3.

was better able to masticate his food, and was pleased with the result achieved, I feel now that it was not advisable to extract the bicuspids. Had I this case to treat again I would enlarge the lower jaw and bring the teeth in mesio-distal relation and establish proper facial lines.

Figure 4 is a model of the teeth of a boy nine years old. The mesio-distal relation of the molars on the right side is correct, but on the left side they are distal to normal. The four anterior teeth show a pronounced superior protrusion, with a slight retrusion

FIGURE 4.

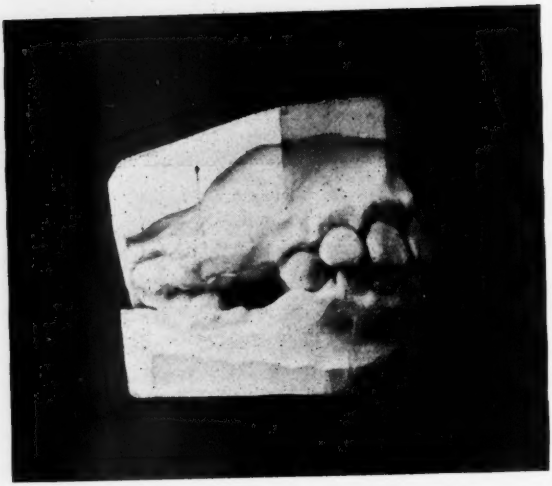


FIGURE 5.

FIGURE 6.

FIGURE 7.

of the lower arch, causing a marring of the facial lines to such a degree as to make him look hideous.

Figure 5 shows the position of the teeth after treatment. There is plenty of room for the bicuspids and cuspids to erupt.

Figure 6 represents the teeth of a young lady who lost several of her teeth through injudicious extraction. There is a slight protrusion of the upper anterior teeth, and a pronounced retrusion

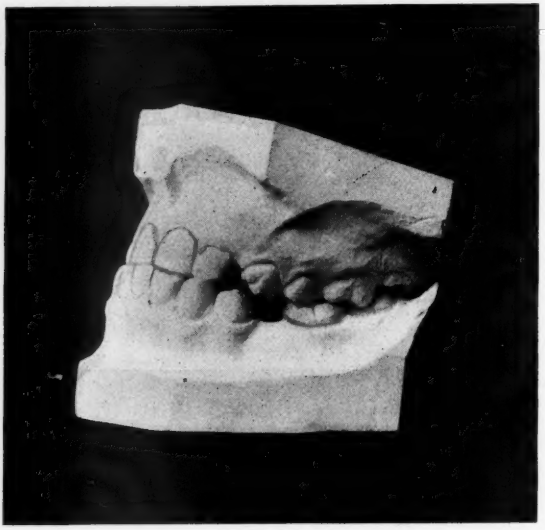


FIGURE 8.

of the lower jaw. It was very difficult to establish the proper relation of the teeth, owing to the loss of some of the permanent ones.

Figure 7 shows the results after treatment. There is enough space between the second upper bicuspid and cuspid for an artificial tooth.

Figure 8 is a case where the deciduous upper cuspid had been extracted at the age of eight years, causing the arch to contract, bringing the incisors into lingual occlusion, the bicuspids and molars remaining in normal relation, and there was no room for the permanent cuspid to erupt normally.

FIGURE 9.

Figure 9 is a profile of the patient, and to look at it one would think that in this case there is a pronounced inferior protrusion, or many dentists would say an overdevelopment of the lower maxilla, and a fit case to perform a resection and diminish its size.

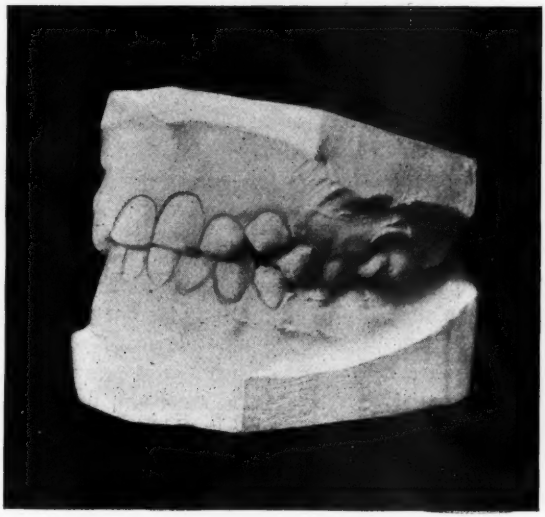


FIGURE 10.

The fact is that it is not an overdevelopment of the lower jaw, but a lack of development of the upper arch, and all that is necessary is to establish a normal relation of the teeth, making room for the late cuspid, and facial harmony will be established.

Figure 10 shows the results after bringing the teeth in proper relation, and the late cuspid has almost fully erupted in its proper place.

Figure 11 is a profile of the patient after treatment and shows marked improvement.

I have presented a number of the many cases I have accomplished, and wish to impress upon you the importance of establish-

FIGURE 11.

ing normal relation of all the teeth. No person will be able to correct and keep corrected malocclucled teeth unless he makes occlusion the basis of this science. More than that, he must have time, patience and means, and must make money a secondary consideration. He must also be able to train his fingers to work out the ideas that suggest themselves, for while many of the ready-made appliances are excellent and efficient, cases present constantly which require special devices, and to be successful the practitioner who essays to master orthodontia must be able to make same. He must also be so imbued with the importance and value of this specialty of our profession that he can impart his enthusiasm and earnestness to both parents and children, and thus secure their necessary cooperation.

CHANGES IN THE SALIVARY SECRETION AFFECTED BY SYSTEMIC DISEASE.

BY HEINRICH STERN, M. D., AND WILLIAM J. LEDERER, D. D. S., NEW YORK. READ BEFORE THE SECTION ON STOMATOLOGY, AMERICAN MEDICAL ASSOCIATION, 1904, AND REPRINTED BY COURTESY OF THE JOURNAL OF THE ASSOCIATION.

Compared to other subjects of interest to the stomatologist, only a few papers of practical value have appeared on this subject as yet. Various experiments and conclusions drawn therefrom are scattered throughout medical literature, but these are of no great practical value, as the investigations were carried on at different times, under varying conditions and on different subjects.

The task which the writers have undertaken is to study the saliva in a number of systemic diseases under as analogous conditions as possible, which is rendered more difficult by the fact that the literature existing on the subject is so little congruous and the results so far obtained are at a great variance. For example, if we study the investigations of the saliva in febrile conditions, what a chaos confronts us. If investigators do not agree on the modifications of the salivary secretion in so ordinary a condition as a febrile disturbance, how much more lacking in unity must be the results of investigations of the oral fluid in chronic affections which present so many different phases and aspects.

The conclusions of this paper are the results of investigations which were carried on under as uniform and congruous conditions as possible concerning the saliva in: *a*, diabetes mellitus; *b*, uric-acidemia; *c*, gastric disease. It is not our intention to enter into the details of this vast subject, as time is limited, but we simply present the results of certain examinations, which will be fully described and published in various journals at a later period.

Before studying the salivary secretion as it becomes modified by systemic disease, it is perhaps not out of place to define normal saliva. Saliva, in the strictly physiologic sense of the word, implies the secretions of the parotid, the submaxillary, and sublingual glands. Ordinarily, however, the term denotes the aggregate secretions of all the glands pouring their contents into the buccal cavity; the sum total of all these secreta shall be spoken of as saliva in this paper, as it is impossible to obtain saliva in the condition in which it is secreted by the salivary glands proper, and before

it becomes admixed with the other fluids and factors introduced into the mouth.

In order to collect any amount of saliva for measuring or examination, it becomes necessary either to introduce a sponge into the mouth to collect the fluid, or to instruct the subject from whom the sample is to be taken to keep the mouth open for some time without swallowing, so as to permit the secretion to accumulate. Anything or any method that may be employed to collect the saliva directly will act as a stimulant to the gland, by contact or reflexly, and when nothing is employed and the mouth is simply kept open, the muscular exertion of keeping the jaws apart, the air striking the oral mucous membrane, as also the psychical influence, will act as stimulants, and the saliva obtained is not true physiologic saliva, but saliva obtained by stimulation; hence the output of the gland is augmented and more fluid is obtained than would be secreted without the stimulant. However, as the fluid medium is but water, and the chemical factors and active principles are held in solution or suspension therein, it will facilitate matters to consider only these organic and inorganic constituents of the secretion, irrespective of the solvent medium, and to define physiologic normal saliva as: "The total amount of organic and inorganic material elaborated and secreted by the salivary glands under normal conditions, *i. e.,* without undue stimulation by either drugs or other factors, irrespective of their fluid medium and without the admixture of excessive amounts of histologic elements."

Under normal conditions but varying diet the glandular cells may be taxed to perform varying amounts of work, for the ingestion of large amounts of soluble, assimilable elements which enter the blood-current may be followed by an increased output of salivary solids. As long as the system retains perfect metabolic equilibrium, and as long as no local disease obtains in the salivary glands, it does not matter how large the excretion of solid matter may be. The greater the amount of the solvent medium, up to a certain limit, the more perfect may be the excretion. However, it will always remain an open question whether the salivary solids should be completely excreted, or if a residue in the gland, of the same composition and concentration, is normal or not.

The variations that the saliva may be subject to in health may either be a change in the quantity secreted or an alteration in the

composition. In order to ascertain any deviation from the normal it becomes necessary to establish a standard as normal. The actual amount of saliva secreted during twenty-four hours has been expressed in varying figures by different authors. However, as the activity of the glands is modified by many conditions, all of which must be considered normal, as diet, amount and nature of ingesta, the manner of eating and masticating, and also the psychic condition of the subject, and as all these factors do exert a positive influence on the organism and actually modify the secretion, and as it is impossible to have all these conditions congruous in any two cases, and as the results under unlike conditions must vary, figures are but relatively correct and cannot be accepted as the absolutely physiologically correct standard of the amount of fluid secreted. As figures will not express the normal amount of saliva secreted, for stated reasons, it will perhaps be physiologically correct to define the normal output of saliva as follows: "The normal output of saliva secreted is that which is put out without artificial stimulation (by drugs or any factor that will act as an irritant to the gland directly or reflexly) and without the subject being aware of its secretion, irrespective of figures."

Having determined what can be called the normal output of saliva, what will be abnormal and what will be pathologic, and which can be classed as either? Any condition beyond those productive of normal secretion will of course produce an abnormal or pathologic action of the gland, but how is one to distinguish between these two? "An abnormal secretion is one produced by artificial stimulation, as by drugs or any other factor producing an altered secretion." "A pathologic secretion is one produced or altered by local or systemic disease."

Another property of the saliva that is expressed in greatly varying figures is its specific gravity. Inasmuch as this properly depends on the amount of solids contained in the secretion, it (specific gravity) also is subject to many modifications, and the absolute physiologically correct standard can be obtained only by determining the amount of solids in a given amount of normal saliva. Experiments in this direction will also appear at a later period.

To study the question of modified saliva from all points of view would necessitate an accurate quantitative and qualitative analysis

of the secretion in a normal state and the same examination of the fluid as secreted in disease. To do this at the present is impossible, as the glandular activity and the secretion itself are subject to many and rapid changes, so that no two examinations would show like results. We therefore confine ourselves to the study of such eventual alterations of the oral fluid as are not accidental and thus may become of practical value to the medical and dental diagnostician.

Alterations of the Salivary Secretion in Diabetes Mellitus.—The saliva of one hundred and fifty-eight cases of diabetes mellitus was examined; altogether three hundred and eighty-four tests were made, from which the following data were obtained: Alterations of the quantity secreted.—The amount of saliva was found to be decidedly increased in six cases, decidedly diminished in eighty-nine cases, normal in sixty-three cases. The subnormal secretion was very likely due to the same causes as is the diminution of the secreta of other glands in this disorder, namely, the increase of the urinary water.

In making these quantitative examinations the samples were always obtained about two hours after breakfast (except where otherwise stated). In order to avoid any secretory changes due to psychical influences the patient was requested to expectorate into a watch-glass while being engaged in conversation. This was measured by a standard obtained by taking many hundred samples in the same fashion from healthy individuals. If the patient could bring forth but a few drops of saliva after repeated efforts the secretion was called decidedly diminished; if, on the other hand, the amount expectorated would fill or flow over the watch-glass it was termed decidedly increased.

The Reaction.—Acid in forty-seven cases (two hundred and fifteen examinations); alkaline in ninety-two cases (one hundred and sixteen examinations); neutral in eight cases (fourteen examinations); not examined, eleven cases. The tests for the reaction were litmus paper and phenolphthalein.

Alterations in Composition.—Glucose was found in the saliva in eighty-five cases (one hundred and eighty-one examinations), and no glucose was found in seventy-three cases (two hundred and three examinations). The examinations for glucose were made with Nylander's solution and with phenylhydrazin.

The diastatic quality was found unchanged in about ninety per cent of the cases examined. A quantitative test for the conversion of amylum into maltose, glucose and dextrin was not made on account of the small amount of secretion obtained at a time. Trommer's test was employed in these examinations; the tests were made at 40 degrees C. One gram of amylum was boiled with ten cubic centimeters of water and ten parts of the starch solution were mixed with one part of saliva and kept at 40 degrees C. To this Trommer's solution was added. If the diastatic quality of the saliva is normal a yellow precipitate, which later turns red, is formed in from fifteen to forty-five minutes. If the changes take place in from five to fifteen minutes the diastatic property is increased, and if it takes longer than forty-five minutes for the reaction to take place the diastatic property is subnormal.

All the cases in which glucose was demonstrated were of undoubted genuine diabetic character, and in those cases where glucose could not be found in the oral secretion, although it was excreted in considerable amount in the urine, the glycosuria of some was apparently of non-diabetic origin. The cases of true diabetic glycosuria, after a rigid antidiabetic diet had been pursued for some time, so that the urine became free from sugar, exhibited the same changes in the salivary secretion, so that no salivary glucose could be demonstrated after the urinary sugar had disappeared. This fact would evidence the common hyperglycemic origin of the glucose in both fluids. Again, the appearance of salivary glucose is by no means indicative of the severity of the diabetic condition, for the degree of the condition does not depend on the degree of hyperglycemia. The milder cases of diabetes, at least those of well-established diabetes not influenced by dietary regulations, are often characterized by the excretion of very large amounts of urinary and salivary glucose. The reduction of the carbohydrates often causes a secession of the sugar in both fluids. In some of the graver cases of diabetes no glucose was found in the saliva on any occasion. In one instance more than twelve examinations were made and salivary glucose could not be demonstrated. These are the cases where very likely secondary glandular changes, sclerotic in character, had taken place and where no secretion whatsoever was going on.

Alterations of the Salivary Secretion in Uricacidemia.—Twenty-

eight cases were observed; fifty-nine examinations were made. These cases partly manifested symptoms of arthritis uritica, partly of chronic affections of the upper air-passages, and partly of contracted kidney and its consequences.

The saliva was found to be increased in not one case; was diminished in only one case.

The reaction was obtained by the same tests employed in diabetics; was found to be alkaline in fifty-two examinations, acid in five examinations; neutral in two examinations.

The diastatic quality in but eighteen examinations made was found normal thirteen times, somewhat subnormal three times, and decidedly subnormal twice.

Biliary pigments were looked for at fourteen examinations, and demonstrated but once by Gmelin's test.

Uric acid was looked for fifty-nine times, and demonstrated in the saliva but twenty-one times, the murexid test having been employed.

Alterations of the Salivary Secretions in Some Gastric Diseases.—All the examinations of the saliva in gastric disease were undertaken after the diagnosis had been made and before treatment had been begun, as medication would influence the saliva both systemically and locally.

Acute Gastritis.—Twenty cases were examined. The quantity of saliva secreted was found to be increased in nine cases; in the others, about normal. The reaction was found to be acid in eight cases, alkaline in twelve cases; acidity was found to be due to lactic acid in two cases. Uffelmann's test was employed (modified, as it has been used in Dr. Stern's laboratory for some years; that is, salicylic acid is substituted for carbolic acid). Twice the acidity was found to be due to acetic acid (ferric chlorid test), and in four cases the character of the acidity was not determined.

Hyperchlorhydria.—One hundred and eighty-two cases examined gave the following results: An increased secretion was found in twenty-seven cases; the others showed a fairly normal secretion. The reaction was found acid in seventy-one cases, alkaline in forty-one cases, neutral in five cases; amphoteric in all others, or in sixty-five cases, that is, the secretion was both alkaline and acid; in other words, red litmus paper turned blue and blue paper turned red. These facts are of interest to the stomatologist, as it shows that a

hyperchlorhydric stomach does not always produce an acid saliva; also it is important to always use both red and blue litmus paper in testing the reaction of a secretion, as one or the other used alone is liable to mislead the examiner. The acidity was found to be due to lactic acid in twelve cases, acetic acid in twelve cases, lactic-acetic acid in nine cases, inorganic acid (HCl) in six cases (Günzburg's test); in the others it was not demonstrated.

Hypochlorhydria.—Twenty-three cases were examined. The quantity of saliva secreted was found to be decidedly increased in but one case; the other cases showed a fairly normal quantitative secretion. The reaction was found to be acid in two cases, alkaline in fifteen cases, amphoteric in six cases; acidity was found to be due to lactic acid in one case, formic acid in one case.

Pyloric Stenosis.—Fifteen cases examined. The secretion was found to be increased in three cases; balance fairly normal. The reaction was found to be acid in five cases, alkaline in eight cases; in two cases the reaction was not determined. Acidity was found to be due to lactic acid in two cases, acetic acid in two cases, lactic-acetic-formic acid in one case.

In presenting these data, obtained from over thirteen hundred individual examinations, we do not claim to have brought forth anything new or startling, but have applied old principles in a new direction, and while the results obtained may not be of direct value at once, they open new avenues for investigation which in course of time may become instrumental to shed light into pathways that at present are somewhat dark, namely, the coherence or non-coherence of systemic and oral disease, what *rôle* the salivary secretion plays in these derangements, how it is affected by either, and the disclosure of this will entail new, better, and perhaps more successful treatment.

FUNDAMENTAL PRINCIPLES OF EXTENSION IN PROXIMAL CAVITIES IN BICUSPIDS AND MOLARS.

BY CHARLES E. SLAGLE, M.D., D.D.S., KEOKUK, IOWA. READ BEFORE THE IOWA STATE DENTAL SOCIETY, AT DES MOINES, 1904.

Any reference to the subject of cavity extension may sound to some like "a voice from the tomb," and yet to others it may be

intensely interesting, because it comes very close to the principles by which the average practitioner, in his everyday drudgery over dilapidated molars, is endeavoring to justify his own existence. He finds the subject discussed and written upon in every journal, perhaps as much or more so than any other theme, and after all is said and done we may safely say that there is probably no principle in operative dentistry that is as universally misunderstood or is the victim of as much misconception as is the original and decidedly practical idea of *extension* in cavity preparations.

We may consider proximal cavities as being extended for three purposes—first, for "prevention;" second, for "access," and third, for "retention."

It is highly essential, with reference to success, that the operator —whether he be surgeon or dentist—should understand the nature of the condition he is treating. He should know *why it originates, how it extends,* and *what means are necessary* to *prevent it;* and with these thoughts in mind we as dentists find ourselves in the midst of the ever interesting subject of dental caries, *why* it begins, *how* it extends, and *what* is necessary to prevent it. We may say that it is of *specific* origin, but influenced to a marked extent by predisposing and surrounding conditions. From the standpoint of the exciting cause these things are necessary: we must have a specific infection, *it must have a suitable habitat,* and *must be allowed to remain in its own quietism for a definite length of time.* It must be a specific organism, because it must produce an acid; it must be able to cover itself over with a gelatinous material that it may remain in situ sufficiently long to produce the acid; and having done this, the gelatinous covering must be of sufficient consistency to prevent the dissipation of the acid in the fluids of the mouth, and must hold it in concentrated form against the tooth for a definite length of time, that it may dissolve the lime salts of the enamel.

These facts necessarily suggest the idea that portions of the teeth which would be protected from the ordinary wear and tear to which they are subjected would naturally be especially inviting to bacteria as a place in which to establish themselves and begin their work of destruction. These places have been called "areas of liability," and for the convenience of study have been divided into several divisions, one including the proximal areas of all the teeth, and being the one that concerns us at the present time.

What, now, is the extent of this area? Dr. Black refers us to the fact that dental caries never begins under perfectly normal gum tissue, so we may take for the gingival boundary line of this area the gum line or interproximal tissue; for the occlusal boundary, a line just including the contact point; while the lateral boundaries would pass into the embrasures to a position in which any accumulation on the surface would be swept away during the process of mastication, brushing, or any other method of cleansing the teeth.

What, then, is meant by extension so far as prevention is concerned? Simply the removal of this area of liability, and when this is done Dr. Black tells us that extension for prevention is fully satisfied. It may readily be seen that the size of these areas is regulated to a large extent by outside influences and that the boundary lines are not the same in all cases and under all conditions. The teeth may be round in form, in which case the embrasures open up abruptly, necessarily making the area of liability small, while in other cases the teeth may be broad and flat on their proximal surfaces, making an extensive contact point, in which case the area of liability would be much greater. Again, the size of these areas may be influenced by the "immunity" or "susceptibility" of the patient to dental caries, also by the exercise of prophylactic measures, meaning by this intelligent care in brushing and cleansing the teeth in general.

So we may see at once that there can be no hard and fast rules as to just how much of the proximal surface of a tooth shall be removed. What would be sufficient extension in one case would be of no benefit in another, while in still other cases very little would be necessary. Every patient is a study in himself. We must note the conditions which exist in each individual case and decide on our knowledge thus gained what extension is necessary, for we have no more right to unnecessarily sacrifice sound tooth structure than the surgeon has to amputate more of a limb than is necessary.

Having extended the cavity so far as preventive measures indicate, we next come to the matter of extension for gaining *access*. Here again the conditions may be modified. The operator is the best judge of his own ability. Some men can manipulate filling materials and adjust them to perfect adaptation where others cannot. As a general rule, however, we may say that all proximal cavities in molars and bicuspids should be made to include the occlusal surface to such an extent that the cavity will be the same size

all the way to the gingiva, because the cavity must be filled from the occlusal side; but in incisors and cuspids especially the operator is left to exercise his own individual skill in manipulation. The areas of liability in these teeth are so small and influenced to such a marked extent by surrounding conditions, that unless the tooth structure has already disintegrated the matter of extension becomes one for gaining access rather than for prevention.

Lastly, but by no means the least, comes the matter of extension for *retention.* The first essential point here is for us to study the occlusion and determine just how much stress that particular filling will have to stand. We must bear in mind, however—especially with reference to proximal cavities in bicuspids and molars—that the base must be made to support practically the entire weight put on the filling during mastication, thus preventing any *lateral pressure,* which would tend to fracture. This would mean that the base of the cavity be made to represent a horizontal plane surface, extending from the buccal to the lingual side of the cavity. It should be a little lower where it joins the axial wall, but must be a gradual incline and never grooved. The buccal and lingual walls should be at right angles to the base, and as they pass toward the axial wall should converge to such an extent as to keep in line with the enamel cleavage and in the same general direction with the dentinal tubules, thus precluding the possibility of cutting off the nutrient supply to any part of the dentin. The axial wall should be flat and meet all the other walls of the cavity at a definite angle. The real anchorage seat of these cavities should be in the occlusal step cut at right angles to the proximal part of the cavity, which fortunately doesn't very often call for the sacrifice of any considerable amount of tooth structure, because the occlusal surfaces are generally already in need of attention.

Having extended the cavity sufficiently in all directions, we must use every precaution—with reference to the surrounding structures—in building the filling so that none of the boundary lines of the original area of liability will change. This would mean that the filling be properly contoured, the point of contact be round and small, and every filling be made to prevent subsequent injury to the interproximal tissue, which should be guarded as carefully as the living pulp.

These principles are given only as fundamental laws to govern

us in establishing a basis in proximal preparations, and should be supplemented by strenuous efforts on the part of the operator to familiarize himself with every condition surrounding the individual case. It behooves us therefore, as servants of our fellow-men, to understand each case thoroughly, to develop the greatest possible skill we can in manipulation, and to learn to apply mechanical principles properly, that we may know to just what point and no farther extension for any purpose should be made.

PROPHYLAXIS: ITS VARIOUS PHASES IN RELATION TO CONSERVATION OF THE TEETH.

BY CHARLES F. ALLAN, M. D., NEWBURGH, N. Y. READ BEFORE THE AMERICAN MEDICAL ASSOCIATION, SECTION ON STOMATOLOGY, 1904, AND REPRINTED BY COURTESY OF THE JOURNAL OF ASSOCIATION.

I want to make a broad distinction between reparative and restorative operations, and to weigh relatively the importance, from a tooth-saving point of view, of some prophylactic measures. Broadly speaking, prophylaxis, the prevention of disease, should be the highest aim of the physician. In our specialty of medicine we are perhaps nearer concrete facts than the general practitioner; the organs that furnish our principal work are in sight and lesions are generally visible and within reach, and possibly it is not asking too much for the average patient to expect more of us in the way of prevention than in the warding off of disease by the family physician. Certainly if we do not accomplish quite as much we are very culpable. Prophylaxis is prevention—prevention of what? Not simply the loss of teeth by caries, nor added to it the loss of few or many teeth by pyorrhea, but it means the prevention of the loss of the full comfortable use of thirty-two teeth through the whole or main part of possibly a long life. I do not think this at all too high an ideal to have before us, but at present in a large majority of cases we certainly will not reach to this standard.

The great controlling factor in relation to immunity or non-immunity from caries has reference to the condition of the secretions of the mouth. We are now in the early stages of our examinations into the histo-chemistry of the saliva, and though we have

a limited knowledge of the conditions making for decay, we are as yet unprepared and unable to change those conditions to one of immunity. Often we will not have the complete support of the patient in the matter of hygienic cleanliness, without which we are powerless to accomplish the best results, and it will also generally be impossible for any one person to have the consecutive management of many mouths extending over a series of years dating from childhood, without which the best services cannot be rendered. Still, prophylaxis is steadily gaining; hygienic cleanliness is being more and more insisted on by the dentist and more and more practiced by our patients, and this greatly offsets environment. With better modes of treatment and a more careful living up to the high ideals of nature, we have every reason for encouragement.

The high standard of success here outlined in the salvation of the teeth involves of necessity a knowledge of the perfection of the normal conditions of the tissues and organs of the mouth; this in the environment of the teeth, in the teeth themselves and in their arrangement, and in the relation of the teeth of one jaw to the teeth of the opposing jaw.

I have placed at the head of these phases of necessary normal conditions that of environment, and yet if I am asked to describe what I consider a normal environment, mainly, of course, with reference to the juices of the mouth, I can only say I cannot tell. So far the chemical constitution of what may be called normal saliva has never been described and I think cannot be, that is, in its exhaustive and ultimate analysis within the varying limits of what still may be termed normal. We occasionally hear of the rare case of an aged person who has never been to a dentist and who has never lost a tooth, and very much more rarely we meet such an one, but in what respect the saliva of this *rara avis* has differed from the mouth secretions of the ordinary individual we do not absolutely know.

We do know that Dr. Michaels found that a hypoacid condition of the saliva was generally associated with rapid destruction of tooth tissue, and a hyperacid condition was associated with comparative immunity from decay. He also clearly proved the intimate relation of immunity from caries with certain conditions found in the saliva, and he found radically different conditions of the saliva where caries was rampant. The researches of Drs Kirk, Kyle,

and others confirm those of Dr. Michaels. We know also that the immunity from caries in the rare cases I have referred to has not been the result of extraordinary cleanliness. The deduction seems obvious.

The researches of Black, Williams and others have proved to us that in the main the physical conditions of the teeth of different individuals of adult age are substantially the same, and the facts that are before us every day, showing the wide difference of conditions of tooth preservation, all point to a cause for tooth destruction outside of the teeth themselves; this means, of course, in their environment, and this is now universally recognized.

To quote a truism of medicine put in simple words, "It is a well-known clinical and laboratory fact that a study of the products of the secreting organs, which in their excreting functions throw off waste material, gives us by deduction a fair idea of what process is going on within the body." This being true, why, as an index of systemic conditions, would not the study of the saliva give as good an idea as the study of the urine, especially as the latter is solely a waste product, while in the saliva, swallowed as soon as excreted, we have products of metabolism which return into the system as a part of a physiologic process?

The bearing of all this on tooth destruction is of course even more intimate than I have suggested above in connection with general systemic conditions, for the teeth are bathed in the secretions of the mouth and are exposed continuously to the fermentative and bacterial results of their environment.

The present relation of prophylaxis in this connection is as follows: We know the distinctive condition of the saliva, as found by Dr. Michaels and others, when related to rapid decay of the teeth; we know another distinctive condition of saliva seemingly always associated with immunity from decay; but I am afraid to say that as yet we know how to influence nutrition to that point where we can change the undesirable condition to the one that means tooth preservation.

The study of the histo-chemistry of the saliva is one involving organic chemistry of the most intimate nature, and requiring an immense amount of laboratory detail and the study of formulæ and analyses requiring any amount of time. The advance already made is very great, and the introduction of the micropolariscope,

according to Dr. Kirk, is a most valuable aid. To know the actual condition from which we require relief is a great point gained.

Drs. Kyle, Milligan and others, in connection with hay-fever, ozena, and diathetic and nervous diseases of various kinds, have gathered diagnostic indications from the saliva that have secured successful treatment and have proven to them of the greatest professional value. We are pointed in the right direction, with a solid substratum of facts to work up from. Laborers in this field are very necessary, and the reward, how to help secure immunity from caries, is the greatest that can be put before the dentist.

We cannot conceive of any period when absolute hygienic cleanliness in the mouth will not be necessary, but up to that time in the future when we shall be able to change by treatment the destructive character of the mouth secretions, this same hygienic cleanliness, as advocated and practiced by its well-known exponent in Philadelphia, is and will be our best sheet anchor for the preservation of the teeth.

Normal occlusion, that is, occlusion as opposed to malocclusion, as described so well by Dr. Angle in his record work on "Orthodontia," is a very necessary factor in prophylaxis. The knuckling up of the several teeth against one another, thereby securing for each tooth under stress the support of all the teeth in the arch, is most necessary and helpful, and is conducive to comfort and tooth preservation. Now, when we add to this the perfect normal relation of the teeth of the mandible to the teeth of the upper jaw, that perfect relation of the planes and cusps of the teeth of the two jaws to one another, we have an ideal arrangement, a perfection of mechanical adaptation and artistic lines a better than which we cannot conceive. Consequently, when we have a case of malocclusion to correct it is this perfect ideal we must try to work up to, and we must always remember that the Almighty found thirty-two teeth none too many for the purposes of his perfect work, and it is not at all likely that we can do as well with less.

Now, the practical application of this matter of normal occlusion to prophylaxis lies in the interdependence of one tooth on another, as mentioned above. It lies in the fact that each tooth in a normal arch is necessary to the best welfare of every other tooth, and that you cannot remove one tooth without injuring all. The natural tendency of the back teeth, in the absence of mesial support, is to

move forward, and unfortunately that tendency is not to move *en masse,* but to follow the line of least resistance and seemingly pivot on the ends of the roots, the crowns tilting, with the effect of not only destroying to a great extent the mutual support of adjoining teeth, but also destroying more or less that perfect relation of the teeth of the two jaws to one another.

All irregularities of the teeth, and especially all losses of teeth, are provocative of further trouble. The proper interdigitation of the cusps of the teeth of one jaw in the sulci of the teeth of the opposing jaw is interfered with, the area of masticating surface is reduced, and what remains is usually not in as good condition for service. Some of the teeth no longer have the stress of use along the line of the axis of the roots, and the tilting continuously increases. The malocclusion affects also certain teeth, that otherwise would be in normal health, by putting on them unusual strain in a direction the teeth are not expected to bear, with the result of loosened teeth in diseased sockets. The tendency of all such malocclided teeth is to get lame and loose and to be early subjects for pyorrhea, and in the end the forceps. Teeth irregularly placed in the jaws are difficult to keep clean, and are much more prone to caries, and in more ways than I have time to speak of malocclusion tends to tooth loss. Proper occlusion, especially when attended to early in life, is an eminently important factor in prophylaxis.

Tooth loss is occasioned mainly by departure from the high ideals established for us by Nature. The teeth, generally erupting with normal shapes and with normal structure and physical conditions, are by reason of perverted environment subjected to caries. Caries generally means repair, and in the fullest sense of the word should mean restoration, and it is this in many cases incomplete repair and hardly at all restoration that are the great causes of tooth destruction. To give a broad generalization in one short clause, we should live up to nature.

All these years, in which we have made so many and so great advances as a profession, we have been handicapped by the fact that we have had no filling material that was at all ideal. Amalgam, tin, gutta-percha, cements, have all done us great and good service, and above all gold. The latter is a royal metal and has done our patients a royal amount of good, but restoration has been of contour only; not a restoration of color and appearance;

not a restoration of thermal non-conductivity; not a restoration of the vitreous polished enamel surface which is of such immense importance, and this lack of restoration has generally been at the expense of serious distress to our patients; often of serious physical and nervous strain to the operator. Drs. Varney and Webb, and others as well, practically gave their lives to establishing their high ideals of tooth restoration, and then their ideals failed in the above-mentioned serious respects. All glory to them, however; they were in advance of their fellows, and we are much better dentists by having had their ideals to work up to.

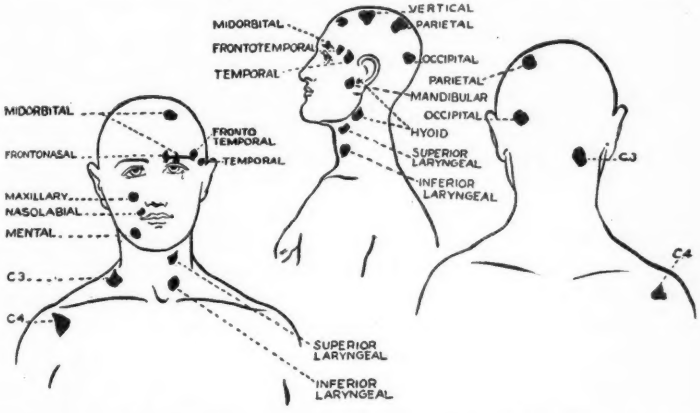
Now the relation of all this to prophylaxis lies in the fact that in just these important matters in which tooth restoration fails with gold it is a success with porcelain. The vitreous polished surface, practically continuous with the enamel surface, the non-conductivity of the material, its comparative ease of insertion at an immense saving of time, pain, and nervous strain, are all important respects in which the prophylactic value of porcelain transcends that of other materials. I cannot go into details, but it is entirely practical in the great majority of cases to fill the occluso-proximal cavities of the bicuspid and molar teeth with porcelain, at a great saving of strain and pain to the patient, with a perfect restoration of contour made in the furnace and not in the patient's mouth, and such restorations if properly made will be permanent. For the sake of brevity I have instanced only occluso-proximal cavities, because they are possibly the most difficult and the necessities of such cases are greater, but the principles involved are the same with all proximal fillings, and the essential saving conditions are just as evident.

The last few years have developed an immense amount of literature on prophylaxis, but it has been of the narrow kind that has seen but one phase of the subject, and for that has claimed the earth. All of you know that prophylaxis is many-sided—has, indeed, many more sides than I have had time to indicate—and that though hygienic cleanliness is one phase, and a very important one, it is still not all there is that stands for the prevention of the loss of the teeth.

FACIAL NEURALGIA—ITS DIAGNOSIS.

BY HARVEY N. JACKSON, D.D.S., MILWAUKEE. READ BEFORE THE WISCONSIN STATE DENTAL SOCIETY, AT MANITOWOC, JULY 19-21, 1904.

When we speak of civilization we are in a sense considering the human race in its evolution from the animalism of the savage to the cultivation of the finer qualities in man, which result in a more highly developed nervous organism. Modern civilization brings with it more liability to nervous disorders. In other lines, mechanical, scientific and the arts, the world is making more exact-



ing demands upon the workers in these respective fields, so the changed conditions of the nervous mechanism make new demands upon the expert in neurotic affections.

In view of these facts the question may well be asked, are we as a profession meeting these demands? Are we keeping pace? Are we near enough to the band at the head of the great procession in this onward march of civilization to get the rhythm and enthusiasm to keep us stepping in line? If we expect our profession to keep the place to which it is entitled, that of standing side by side with the other learned professions, we must see that we are prepared to meet these new and growing demands upon our knowledge and skill. To do this we must make a more scientific study of the nervous system.

The public is rapidly learning that the skilled dentist is of great service in the treatment of facial neuralgia, and the dental practitioner is depended upon for help in these disorders. Do we accept this responsibility with the seriousness it deserves? We are often called upon to consult with the family physician, the oculist, or the aurist in obscure cases, and our word is taken as final as to whether or not the cause lies in the dental organs.

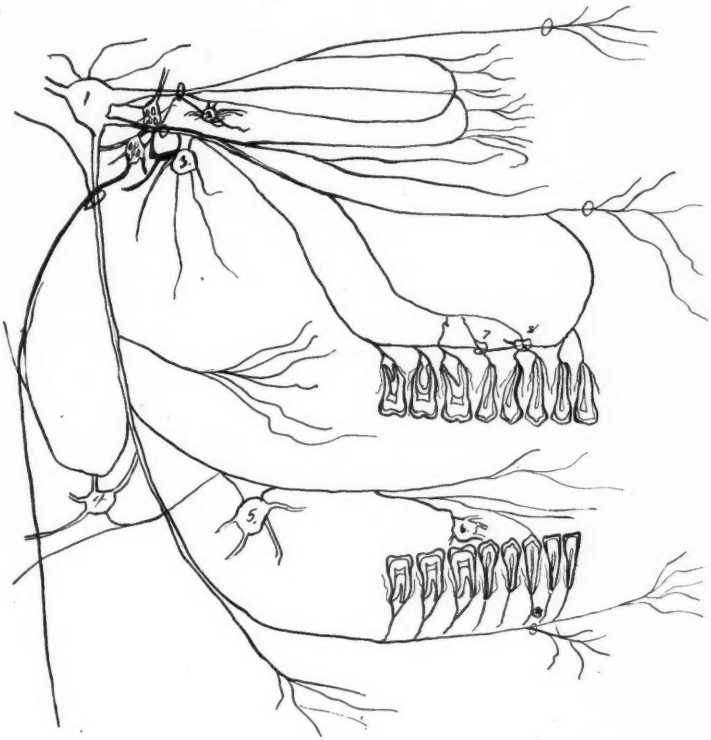
I hold that if we are to be of the highest service to men of the medical profession we must meet them on common ground and be prepared to talk intelligently about the case in hand. This necessitates looking below the organs upon which we work, and making a deeper study of the nervous system with which the teeth are so intimately connected. In fact, the study of neuralgia is a study of the nerves, hence I shall devote a considerable part of my time to a study of their function.

At the outset it will help us to understand the nervous reflexes and the wide range of possible deflections of nerve impulses from the normal course if we keep in mind the fact that the brain is the great center, the ganglionic head of the nervous system. The brain interprets all impressions sent to it through the nerves and normally refers them to the proper places. Owing to pathological conditions the nervous mechanism may become deranged to such an extent that the impression may be misinterpreted or wrongly conducted or both. The nerves act simply as conducting wires. For instance, if the trunk of the sensory nerve supplying the palm of the hand be severed and the stump irritated, the brain still refers the sensation to the palm of the hand.

Albert P. Brubaker says we may liken the central nervous system to the intricate switchboard of a large telegraphic office, where are focalized wires from all points of the compass. When the mechanism is working properly the message from any peripheral point is shunted to its proper receiver, transferred to another wire or sent into other offices. Subordinate ganglia and plexuses may be looked upon as local stations with limited authority. With the switchboard out of order and the wires displaced, how helpless is the operator at the key, especially if he does not thoroughly understand the mechanism with which he works, and is thus unable to discover the cause of the trouble. How infinitely more helpless is the dentist, confronted with a severe and perplexing case of

reflex facial neuralgia, who is not well informed upon the delicate and intricate nervous system of the human body.

The word neuralgia signifies nerve pain. Of course all pain,



1. Gasserion ganglion
2. Opthalmic "
3. Meckels "
4. Otic "
5. Submaxillary ganglion
6. Sublingual "
7. Bochdaleks "
8. Valentines "

from whatever cause, is nerve pain, for if we were without nervous tissue we would experience no pain, but through long usage we have accepted the word neuralgia as meaning a more or less chronic condition of pain of a nerve. To my mind nerve pressure,

the cause, is so closely allied to nerve pain, the effect, that they cannot well be considered separately. Therefore in the diagnosis of neuralgic affections always bear in mind that when pain exists there must be pressure somewhere. Pain upon the center, trunk or branches means pressure caused by displaced or congested organs, tumors, aneurisms, wounds, injuries, carious or broken bones, etc. Pain at the periphery, as for instance, the teeth, means pressure caused by pulp congestion, confined gases, erupting teeth, pulp nodules, exostosis, or the formation of a pus sac. Relieve the pressure and the pain soon abates, though in cases where the nerve has become chronically affected through long-continued irritation it may take some time for it to regain its normal condition after the cause is removed. In obscure cases the dentist is confronted with the question, "Is this nerve pressure in the mouth, and if so, where is it?" I believe a study of the cranial nerves and the sympathetic system will help us to answer both questions, especially the former, and to this end I have prepared the charts to which I now call your attention.

We will begin by considering the trifacial, its origin, course, periphery, functions, and something of the qualities peculiar to itself. I believe we can with as much propriety look upon the trifacial nerve and its branches as a system as we do upon the sympathetic system or the spinal system, and I am going to try to show some of the reasons why I make this assertion. The trifacial is the largest cranial nerve, and arises by two roots superficially from the sides of the pons varolii, passing between the fibers of the pons to its deep origin, the lateral tract of the medulla oblongata, immediately behind the olivary body. Our authorities do not agree exactly as to its connections with the cerebellum and spinal cord, but all agree as to its intimate and close connection with the medulla and pons, which have been called by Brubaker the switchboard of the nervous system.

The posterior sensory root is the larger, and together with the anterior motor root passes forward to the apex of the petrous portion of the temporal bone, where we find lodged in a depression the large Gasserian ganglion upon the sensory root. The motor root passes beneath this ganglion, through the foramen ovale, and joins the inferior maxillary division just after it emerges from the cranium. The Gasserian ganglion is adherent

to the dura mater, and on its inner side receives fibers from the carotid plexus of the sympathetic, and it also sends branches to the tentorium cerebelli. These connections are mentioned to show the relation of the trifacial nerve to the different portions of the brain, thus helping to explain why we so often find headache accompanying severe odontalgia.

I would here call your attention to the three great branches coming off at the anterior side of the Gasserian ganglion. The first, or ophthalmic division, the highest, and the second, or superior maxillary division, being exclusively sensory nerves. The third, or inferior maxillary, is compound in function, receiving, as before stated, the motor root. There also passes from it a nerve of special sense, the gustatory, supplying the tongue.

The ophthalmic, together with branches from the superior maxillary division, supplies the eyeball, the membranes and periosteum of the eye socket, the muscles of the eye, and the nose. You will note that the first division, the major part of the second division, and the ophthalmic ganglion are within the eye socket. Branches from the second and third divisions supply the mouth, the muscles of mastication, the ear, cheek, tongue and teeth. The periphery of the trifacial supplies the surfaces of the head and face with sensory nerves, hence the so-called superficial sensitive areas when the trifacial is the seat of severe and long-standing pain. The trifacial and the eighth pair, consisting of the glosso-pharyngeal, pneumogastric, and spinal accessory, are the only compound nerves of the cranial system, supplying both motor and sensory fibers. The trifacial is the great sensory nerve of the head and face, supplying the anterior part of the cranium and the face. The sensory nerves to the posterior cranium are supplied chiefly by the cervical branches of the spinal system of nerves.

The next point to which your attention is called is the ganglia upon the branches of this nerve, eight in number. These are the Gasserian, the ophthalmic, Meckel's, the otic, the submaxillary, the sublingual, Bochdalek's, and that of Valentine.

The presence of the ganglia upon the fifth cranial nerve presents an analogy to the sympathetic system with its numerous ganglia and plexuses. In fact, the ganglia upon the trifacial have been claimed as part of the sympathetic system, and our anatomists call the trifacial the cephalic portion of same. This nerve has connec-

tion near or remote with all the cranial nerves, but it is most intimately connected with the facial. We so often find ear affections more or less serious with facial neuralgia that it may be well to here point out the connecting nerves to the internal ear. The trifacial is directly connected with the cavity of the tympanum through the chorda tympani branch of the facial, which runs to the gustatory branch of the inferior maxillary, thence to the submaxillary, thence to the submaxillary ganglion, also from Meckel's ganglion through the large petrosal, and again from the otic ganglion through the small petrosal and auriculotemporal. We also find a small plexus of nerves, the infraorbital, situated on the outside of the bone just below the infraorbital foramen, and formed by an anastomosis of the terminals of the trifacial and facial nerves.

Your consideration is next called to the periphery of this nerve. First, its exposure to external irritating influences, owing to the fact of its supplying the membranes of the eye, nose and mouth with sensory nerves. We usually consider the pulp of a tooth as the terminal of the nerve, but it seems to me that the pulp, with its highly organized and sensitive nervous network, might more properly be called a ganglion or plexus, and the real periphery considered as that portion of the sensitive nervous tissue supplying the dentin and spreading out beneath the enamel. Another fact to confirm this belief is that it is thought the pulp has little or no localizing sense, and when irritated at times causes nervous reflexes very hard to locate. It is the peripheral ends of the nerve that supply the pericementum, and here we have the true touch organ of the tooth.

A glance at the chart shows the connection between the teeth and the eye to be so intimate that it seems unnecessary to go into details. This intimacy is particularly marked between the anterior superior teeth and the eye. Troubles with the eye very often cause odontalgia and severe dental neuralgias, and toothache causes pain in the eye socket, and in many cases great tenderness of the eyeball.

A study of this nerve would not be complete without an allusion to its connection with the sympathetic system of which it forms a part. These connections are chiefly through the carotid and cavernous plexuses and the communicating branches of the facial.

The sympathetic system works automatically, supplying and controlling the organs of the body. The ganglia and plexuses of this system are numerous, but I will mention only those which concern us most. Beginning from above and proceeding downward after leaving the cranium, we find the principal centers are the cervical plexuses, the cardiac plexuses, the solar plexus, and the hypogastric plexus. This last, with those branching from it, supplies the pelvic organs. The organs of generation are richly supplied with nerves from this sympathetic system.

Pathological conditions in the organs supplied by the sympathetic system are believed by many to be the direct cause of some facial neuralgias. For instance, indigestion, abdominal tumors, ovarian neuralgia, uterine neuralgia, and many other disorders have been known to cause reflex neuralgic pains about the head and face, and often in the teeth, and the odontalgia of pregnancy is well recognized. Recently a patient applied to me for relief from neuralgia pains in a first lower molar which had been devitalized for some time. Upon inquiry it developed that the patient was under the doctor's care for ovarian neuralgia. At times the pain was present in both ovarian region and tooth, but usually if pain appeared in the tooth it was absent from the ovary, and vice versa. Under the physician's treatment the neuralgia disappeared. Another case might be cited in which the tooth in the mouth of a woman six months pregnant was devitalized and attended with great care. A most persistent and annoying pericemental neuralgia was present in that tooth until the delivery of the child, when the neuralgia immediately disappeared.

The entrance and disappearance of menstruation cause a profound disturbance of the nervous system, and these periods should be taken into account in certain cases of neuralgia.

If space permitted many cases in dental practice as well as physiological phenomena might be mentioned which go to prove the close relationship between the trifacial nerve and the sympathetic system. Neuralgias of systemic origin often exhibit themselves in the face and head. This is more likely to occur if the teeth be diseased. Anemia, syphilis, malaria, and gouty affections sometimes cause facial neuralgia, and in many cases they complicate matters and must be treated with the proper remedies before success in treating the dental organs for neuralgia can be attained.

The time of this convention might be further encroached upon and your patience put to a greater test in listening to a recital of anatomical facts, physiological phenomena and clinical statistics, both medical and dental, in support of my position, but I think enough has been said to convince you that a thorough knowledge of the trifacial nerve and its connections is a necessity to the dentist in the diagnosis of facial neuralgias.

We will now turn our attention to a more direct consideration of the points in diagnosis, beginning with a few general observations. Remember that the severity and extent of the pain, the effect, may bear no direct relation to the cause. In other words, a very serious and obstinate neuralgia may arise from a seemingly simple and inoffensive lesion. Make use of the exclusion method in diagnosing facial neuralgia, working from the known toward the unknown. Examine the teeth and mouth carefully, and place both in good order, beginning with a thorough scaling and polishing. We oftentimes find a facial neuralgia as the result of a plain odontalgia, the cause of which is apparent, as an unhygienic condition of the mouth, an abundance of metal in the teeth, caries, pericementitis, open putrescent roots, abscess with fistulous opening, pyorrhea, erupting teeth, exposed pulps, sensitive dentin, etc. I do not want to dwell upon these more simple and apparent causes of facial neuralgia at this time, because I desire to call especial attention to the pain that is reflex in character, facial neuralgia, the cause of which is obscure.

In some cases after a careful examination of the mouth no apparent cause is found, and the pain is not constant in the teeth, but exhibits itself in almost any part of the head. In these instances it is well for the dentist to give some consideration to possible causes outside of the mouth. Diseases of the eye and ear often cause neuralgia about the teeth. A slight eye-strain has been known to cause a reflex pain in the teeth, and, on the other hand, tooth extraction at times gives rise to pathological conditions of the eye which puzzle the ophthalmologist.

Systemic Causes.—Pain caused by some systemic disease, such as malaria, anemia, or syphilis, is not as severe in character as that caused by some lesion of the trifacial. It is likely to be periodical, and especially is this true of malaria. It is as likely to come on in the daytime as in the night, and it does not necessarily confine itself

to one side of the median line. Neuralgia from systemic causes is amenable to treatment. Sometimes systemic conditions constitute a predisposing cause, and it is well to refer the patient to the physician for treatment.

While explaining the chart I referred to the sympathetic reflexes as a possible cause of facial neuralgia. At the age of puberty and at the menopause there occurs a profound disturbance of the nervous system, and the fact that there is more liability to nervous disorders at these periods must receive due consideration at the hands of the dentist. Pregnancy, abdominal tumors, uterine and ovarian neuralgias must also be taken into account, as these disorders sometimes affect the sympathetic plexuses in their vicinity, and thus give rise to reflexes through the ganglia on the trifacial.

If we can reasonably exclude systemic causes, and those that might arise from disorders of the sympathetic system, we can again turn our attention to the trifacial nerve. We sometimes find the regions supplied by the trifacial the seat of cancerous growths. Cystic tumors of the maxillaries are perhaps the most common, and the pressure exerted by these growths upon the nerve branches causes neuralgia. Usually in these cases the cause soon becomes apparent, and the patient should be directed to the surgical expert.

There remain to be considered tic douloureux and obscure dental lesions. Tic douloureux is a disease peculiar to the trifacial, and usually confines itself to the ganglion of Gasser and the ophthalmic and superior maxillary divisions. The pain occurs suddenly, and the least irritation of any of the nerve branches of the ganglion may bring on an almost unbearable paroxysm. Pain may remain unabated for several days and nights, and not respond to anodyne treatment. It confines itself to one side of the head. It may be of specific origin, and if so will sometimes respond to treatment for the cause. The pain of tic douloureux is much more severe than that of any other neuralgia, and even a slight irritation at the periphery, the so-called sensitive areas as represented on the charts, will cause intense suffering. This sensitiveness at the principal ends of the nerve is a diagnostic point not to be overlooked, as it is not often found where the cause is about the teeth.

Obscure Dental Lesions Causing Reflex Neuralgias.—In these the pain does not cross the median line. It oftentimes starts in a tooth slowly, and immediately exhibits itself as a severe pain at

some other point, and patients unless questioned closely do not mention this most important fact to the operator. The pain is aggravated at night, and catching cold and severe and sudden changes in temperature, as going from a warm room into the outside air, increase its severity. We do not commonly find sensitiveness at the exposed peripheral areas as we do where the nerve substance is affected, although in long-standing cases the nerve may become involved to that extent. Very often we find pain at the temporo-maxillary articulation, also earache. The pain comes on gradually and is irregular.

Carefully explore for sensitive dentin, and you will sometimes find sufficient cause for an obstinate neuralgia in a sensitive spot at the gum margin. A small, sharp exploring needle must be used in probing for suspected suppressed teeth, and do not overlook third molar roots, the crowns of which may have decayed and broken off, the root finally becoming nearly covered with gum tissue.

Antrum affections are as a rule easily diagnosed, as the pain is constant as to location, is of a dull, heavy character, and the patient complains of pressure under the eye, which is relieved after discharge into the nostril has occurred. The patient usually notes an offensive odor.

When neuralgia is caused by deep-seated pulp exposure the cause is not easily located, as we sometimes find root exposures near the apex. Decay beneath the gum margin, beginning at the enamel edge, is very common, especially in the mouths of elderly persons. In exposures of this class the pulp dies very slowly, protected as it is by the gum tissue from external irritation, and the surface may become slightly gangrenous and remain in this condition for months, causing a most severe facial neuralgia. Only careful exploration with a fine probe will search out these deep-seated exposures.

Beware of putrescent roots. You will often find them under gold jacket crowns. Sixteen years of dental practice have taught me that gold jacket crowns cover a multitude of sins for many practitioners, and when I encounter an obstinate case of neuralgia, and can positively exclude other teeth as a cause, I remove all such crowns, almost invariably exposing foul conditions.

Exostosis is not easily diagnosed, but the X ray is the best means. The gum about the part is of a deeper color in severe cases, and

contrary to most root affections, the tooth is more firm in the socket than its neighbors.

In the case of nodular deposits of dentin in the pulp chamber we have another condition where the symptoms, both objective and subjective, count for little. If pulp nodules are suspected open the tooth and devitalize. Of course, devitalization should always be resorted to before extraction. In fact, exostosis and impacted teeth furnish about the only good excuse for extraction.

DISCUSSION. *Dr. R. Ottolengui,* New York: The essayist said he would not extract a bad tooth unless he were certain that it was connected with the neuralgia. Now, it occurs to me that if the extraction of the tooth would be a relief, the removal of the pulp would be just as efficient and would leave the arch of mastication in its normal condition. I think pulp nodules are a consequence that is almost invariably present in teeth that are affected by pyorrhea and also where the attrition has expanded the dentin.

Dr. R. E. Maercklein, Milwaukee: I have a woman patient about forty-eight years old, in whose case the ganglion was removed without harm to her. She says that shortly after the operation there seemed to be some trouble, but about six months after the same pain existed, in fact, it was almost worse than before, and she says if she had it to do over she would not have an operation performed.

Dr. Jackson, closing discussion: With regard to Dr. Ottolengui's remarks, I was not as careful in expressing myself as I should have been. I meant to warn dentists against extracting teeth for the cure of facial neuralgia without good and sufficient cause for so doing. As to pulp nodules, Dr. Ottolengui's longer experience warrants a difference of opinion, and I am very glad he mentioned the point. I have seen very few cases of pulp nodules.

In reply to Dr. Maerklein's remarks I would say that the cure of tic douloureux by a surgical operation has not proven a success in most cases where resorted to, and is an exceedingly dangerous procedure.

In closing, my particular plea is that dentists have a better knowledge of the nervous system, that they may be better able to diagnose facial neuralgia.

Digests.

AILMENTS SIMULATING DENTAL DISEASE BUT NOT DIRECTLY CONNECTED WITH THE TEETH. By C. A. Barnhill, D. D. S., Indianapolis. Read before the Indiana State Dental Society, 1904. *The Eye.*—The oculist when examining for ocular disorders will look carefully to the teeth, remote as they may at first appear to be from the eye. On either side of the spine along its whole extent we have sympathetic ganglia anastomosing freely with all the spinal nerves, also extending upward and anastomosing with the ganglia of the head, which communicate with the cranial nerves. The spheno-palatine ganglion sends branches to the mucous membrane of the nose, and is in direct communication with the Gasserian ganglion. The otic, ophthalmic, maxillary and superior and inferior ganglia are united, thus giving a rich field for transmission of any irritation. Hence any sensitive surface under pathological conditions may give rise to reflex disturbances on account of this complete system of nerves and their connecting ganglia. Then it is true that ocular disorders may arise through caries and other ailments of the teeth, namely, amblyopia, amaurosis, and in some cases vision reduced, which can be restored after treatment of the teeth, and there are cases of spasmodic winking caused by the teeth.

The Faucial Tonsil.—If your olfactory nerve is sensitive to odors, you doubtless have detected some coming from the mouths of your patients which are not pleasant. There are many people who go to a dentist simply because they have a bad breath, and again there are many who go to a doctor to have their stomachs treated because of a bad breath. There are odors coming from the mouth which do not originate in either the teeth or the stomach, but from the faucial tonsil. You are all more or less familiar with the location of the tonsil as it lies, one on either side, between the anterior and posterior arches of the soft palate.

The tonsil consists of an elevation of the mucous membrane representing fifteen or twenty orifices, which lead into crypts or recesses, in the walls of which are placed nodules of adenoid or lymphoid tissue. These nodules are enveloped in a less dense adenoid tissue which reaches the mucous surface. The surface

is covered with a stratified squamous epithelium, and the subepithelial or mucous membrane proper may present rudimentary papillæ formed of adenoid tissue. The tonsil is bounded by a fibrous capsule. Into the crypts open the ducts of numerous mucous glands. With some persons the tonsils become enlarged at intervals, and during the process of enlargement these crypts are also enlarged and the depth increased. The epithelium of these ducts is shed into them, and particles of food are, by the movements of the throat, forced into the channels, and these substances, constantly warm and moist, rapidly decompose. The position of the tonsil is such that at each expiration this foul odor from the decomposing mass is carried out, and any person within range of that breath will detect it if his smelling power is normal. Highly flavored and perfumed mouth-washes, chewing-gum, or anything you please, will not kill this odor, for it will float on and above any of them. Let me advise you who have not paid particular attention to the tonsil to do it now.

Upon looking at a diseased tonsil you can readily see these little crypts, some in the form of a slight depression, others rather elongated, and in some of them you will notice a yellowish, caseous mass in the form of a ball just at the orifice. With a straight spoon-excavator inserted into the orifice and beyond the mass, with the right movement you can dislodge and bring it forth for closer examination. If you mash it between the fingers you will get the genuine odor which will teach you not to be mistaken in the diagnosis of foul breath from diseased tonsils. In cases of this sort advise the patient to consult a specialist. He will treat these little crypts or possibly remove the tonsil bodily. The function of the tonsil is, first, to assist in deglutition by helping to moisten the bolus of food as it passes downward; second, as a lymph gland, of which we have many others in the body, for the manufacturing of white blood corpuscles. You see that its function is so light that the specialist will not take that into consideration if he sees fit to remove it. Ill results sometimes occur from hemorrhage and also from instruments in the hands of a careless operator. I can personally vouch for the statement that the complete removal absolutely cures foul breath caused by diseased faucial tonsils.

The Ear.—In order that we may understand why ear trouble is caused by the teeth, I wish to call your attention to the connection between the nerves of the ear and teeth. The nerves composing the group now called the tympanic plexus are brought into intimate relations with those of the throat, mouth, etc., through branches arising mostly from the otic, petrosal and sphenopalatine (Meckel's) ganglia. By means of the otic ganglion the inferior maxillary, or third division of the fifth pair, is connected with the plexus, while from the petrosal ganglion of the glossopharyngeal nerve arises the tympanic nerve which constitutes the largest portion of the tympanic nerve supply. Connection between the tympanic plexus and the second division or superior maxillary branch of the fifth pair exists also by means of the Vidian nerve through the sphenopalatine ganglion. The carotid plexus of the sympathetic is connected with the glossopharyngeal by means of the small carotico-tympanic branches of Jacobson's nerve and communication between the ear and the superior cervical ganglion of the sympathetic is thus established.

Owing to these intricate nervous connections, is it any wonder that we have disturbances arising in various organs of the body, such as the heart, stomach, genito-urinary system, brain, etc., with which the ear is brought into sympathetic relationship; the teeth, the soft palate, and the membrane lining the oral, nasal and pharyngeal cavities are thereby in direct relationship with the drum-head, the tensor tympani muscle, the lining membrane of the tympanic cavity, and the external auditory canal? When we consider this sympathetic nervous relationship between the ear and the teeth it is not difficult to see that irritation from the latter would be a source of annoyance to the organs of hearing and that dentition, the difficult eruption of third molars, the existence of decayed or otherwise diseased teeth, and the wearing of badly-fitting artificial dentures should frequently excite a reflex disturbance in the organs of hearing.

The surgeon has called attention to the fact that dentition in young children generally causes more or less irritation in the external auditory canal. Such pain in the ear would, if recognized early enough, be quickly relieved in some cases by a free incision into the gums. These conditions should be looked to

early, for it is well known that in cases of long standing the nerve tension will become disturbed and reflex phenomena be easily excited. In this way progressive catarrh of the middle ear, with consequent deafness, may be produced so slowly, indeed, as to be hardly perceptible to the patient. The eruption and decay of the teeth, aside from the local irritation arising therefrom, frequently cause sympathetic disturbances in children of low vitality. The latter is likely to occur from the time the two lower central incisors appear and may continue until the completion of the first dentition. If these teeth are allowed to remain in over time, or even the crowns after the roots are absorbed, they are also causes of aural irritation. Second dentition is also likely to be followed by irritation of the ears. The eruption and rapid decay of the first molar, the preexisting irritation of the first dentition aroused again, and also at this period the strain from mental overwork and worry have an important bearing upon the case.

In the third dentition or cutting of the third molars it is not unusual to witness great and general disturbances. Abscesses of the gums, necrosis of the jaw-bone, attacks of tonsilitis, and some of the most intractable cases of middle-ear inflammation are seen at this period, the latter frequently leading to more or less loss of hearing. Dentition has much to do in the causation of chronic catarrhal inflammation of the middle ear, owing to the sensitive condition of this organ during the different stages of the eruption of the teeth, yet it is probable that the long-continued reflex irritation, due to the diseased state of the teeth themselves, is a greater factor in the production of this form of aural trouble.

In a review of the records of some eighteen hundred cases of ear disease coming under his observation Sexton found that fully one-third of them originated in or were more or less prolonged by a diseased condition of the teeth, and in most instances the aural affections were especially severe. The male sex was somewhat in excess of the female, though not much, and in both men and women the greatest number were affected between the twenty-first and fortieth years. In these cases teeth with putrescent pulps and concealed roots were always present.

Among other things given as a source of irritation to the ear is the amalgam filling, the mercury being likely to be set free

and cause toxic effects, also poorly-adjusted crowns and ill-fitting dentures, which are not kept clean and may have been made over some remaining roots, while vulcanite being a non-conductor is liable to cause a hyperemic and congested state of the mucous surface. The harmful results of retaining diseased teeth in the mouth without giving them attention cannot be overestimated, and this is especially so of persons prone to catarrhal conditions of the upper air passages. The ear when in a state of continued hyperemia due to this reflex irritation is much less able to withstand the effects of such outside influences.

The Maxillary Sinus or Antrum of Highmore.—In order that the clinical phenomena met with in cases of inflammatory affections of the accessory nasal sinuses may be readily understood, the surgeon and dentist should possess a thorough knowledge of these parts. These air spaces may be conveniently divided into two groups, first, the anterior, consisting of the maxillary and frontal sinuses and the ethmoidal cells; second, the posterior, consisting of the posterior ethmoidal cells and the sphenoidal sinus. While these sinuses are very closely connected, the dentist does not have to deal directly with any except the maxillary sinus. At birth the antrum exists merely as a slit-like indentation in the outer wall of the nasal chamber. It presents the following measurements in a new-born child—the vertical diameter three mm., transverse diameter two mm., and antero-posterior diameter seven mm. The growth of the body of the superior maxillary takes place by the formation of a mass of cancellous or spongy bone between the alveolar process and the orbital plate. Coincident with the increase in the cancellous tissue a process of absorption apparently takes place on its nasal and orbital surfaces, thus causing an increase in the size of the antrum. This simultaneous process of growth and absorption continues until about the twenty-fifth year of life. At that time the antrum reaches its complete form and its measurements are about one inch transversely and one and one-fourth inches in a vertical direction.

The antrum may be described as having a roof, a floor and three walls. The floor of the sinus in which we are more particularly interested is formed by the alveolar border of the superior maxilla and bears a very close relation to the teeth. The layer

of spongy bone between the roots of the teeth and the floor of the cavity varies in thickness in different skulls and sometimes upon the two sides of the same skull. The inner or nasal wall of the antrum is of considerable importance. It is convenient to subdivide it into an upper and lower part by the inferior turbinated bone. This plate is thinnest immediately below the attachment of the turbinate, and in that situation offers the least resistance when a puncture is to be made, and gives an opening on a level with the floor of the sinus. The natural opening to the antrum is situated immediately below the roof and does not permit of drainage of inflammatory conditions. Direct communication between the roots of the teeth and the mucous membrane of the antrum, due to defects in the bone, is not often met with, but frequently small elevations are formed on the floor of the sinus by the projecting roots covered with a thin layer of bone. The floor is as a rule thinnest above the first and second molars, so that in the operation of opening into the sinus we meet with least resistance in these situations.

The relation of the teeth to the sinus is of great practical importance. Owing to the variations which occur in the size of the cavity, the relationship is not a constant one. When the cavity is of unusual size the cuspid root lies below the floor of the sinus, but this is an exceptional condition. Occasionally the operator will enter the antrum through the socket of the first bicuspid. The second bicuspid and the three molars, when the sinus is of ordinary dimensions, are in relation to it, but in a considerable proportion of cases the second bicuspid lies just in front of the floor of the sinus. Again, in an unusually small sinus only the second and third molars are in relation to the floor.

Causes of Antral Suppuration.—It may be caused by infection from the nose during some acute specific fever, such as typhoid, pneumonia, measles and scarlet fever, and influenza has also proved a great cause. The nasal mucous membrane is continuous with that of the other cavities and catarrh of the nose is easily extended into them. By understanding the intimacy of these connections you can readily see why there is such a frontal discomfort when we have a cold. The secretions are greater and compelled to remain to a certain extent confined in the cells. When there is in-

sufficient drainage these secretions are compelled to remain under tension, an increase of inflammation may result, and if certain microbes gain access while the mucous membrane is in an inflamed state suppuration may occur. After the suppuration of some one of these cells, for instance, an ethmoidal cell, the pus may find its way into the antrum and even into the frontal sinus.

It was formerly thought that all antral trouble was caused by the teeth, but it has been found that organisms associated with syphilitic nasal lesions, insanitary surroundings, influenza, or convalescence from long illness will cause it. Traumatism, both from the surgeon and the dentist, produces a certain number of cases, but a greater number is traced to infection from the roots of teeth. What per cent is traced directly to the teeth cannot be accurately given, for the different surgeons' statements upon this point vary from one hundred to about twenty per cent. Some have stated that in each one of a given number of cases suppuration of the antrum was directly due to the teeth, though there was only a simple cavity in the crown of a bicuspid or molar on that side, or the teeth had been filled and were apparently in good condition. Understanding the anatomy of a tooth as we do, tell me how a simple cavity will cause suppuration of the antrum? The dentist can readily see why the surgeon could mistake a case of the latter sort, as the tooth has been filled and possibly the pulp previously removed, and some portion of the apical third remains and later causes suppuration, or it may be that the pulp dies under the filling, which could also cause it. If in a case of antral suppuration only small cavities were found in the teeth we would better lay the cause to the lymphatics and blood vessels for transmitting microbes rather than the dental tubuli.

As a rule patients suffering from antral suppuration will consult the dentist only when they know the teeth are at fault. The symptoms of acute antral suppuration are pain in the cheek and supraorbital region and tenderness of one or more teeth if they are directly at fault. Sometimes the face adjoining the nose and under the eye is swollen. I have seen cases that at first did not appear to be caused by the teeth, but upon extraction or treatment of a certain tooth would give the patient great relief, but would not effect a cure.—*Summary.*

ACCURATELY FITTING SEAMLESS CAPS FOR RICHMOND CROWNS. By Edwin W. Harlan, D. D. S., Jersey City, N. J. Read before the New York Institute of Dental Technique, January 24, 1905. It is impossible to overestimate the importance of having the cap of a Richmond crown fit the root of the tooth accurately. We have all seen in the mouths of patients the deplorable conditions resulting from the imperfectly fitted caps of these crowns. The difficulty of making a cap to fit the root accurately, and the results consequent upon the insertion of a crown with a poorly fitting cap, have led many men to abandon to a great extent the use of this most valuable crown. It is not the purpose of the writer to discourse on the value and relative benefits of Richmond crowns, for this has been done many times by much abler writers; but rather to endeavor to describe a method by which accurately fitting caps may be made for these crowns, thus overcoming, he believes from his experience, about the only objectionable feature they have.

The subject of shaping roots for Richmond crowns cannot be properly treated in this short paper, so to expedite matters and to come to the point at once, the writer presumes you will agree that it is necessary to so shape the root to be crowned that its circumference will be at least a degree smaller at the end than at the point under the gum where the edge of the cap will rest. When the root has been so shaped, twist a piece of soft iron binding wire, or copper wire if you prefer it, around the root at the point where you wish the band to end, as in taking an ordinary wire measurement. If this will then slip from the root easily it indicates that the root has been tapered sufficiently, but if difficulty is experienced in removing the wire it will be necessary to continue the tapering until it may be removed easily.

It is well to have at hand a box containing copper bands of different sizes. The copper can be rendered soft by heating it to a bright redness and then plunging it into a vessel containing alcohol and water, equal parts. Columbian spirits or wood alcohol may be used for this purpose. The alcohol bath imparts a very pleasing color to the copper. Select a band the size of the wire measurement and press it on the root until it binds, then mark on the inside of the band the line of the root. Remove the band and trim it by this line, smooth the edges, replace and press the band on the root as far as

you wish the cap to go. Remove excess saliva from within the band and then fill it with plaster which has almost set, pressing the plaster well in, and hold firmly until it has set quite hard. Remove the band and plaster and dry out in the Bunsen flame. To prepare the mould for casting, take a rubber bulb from a medicine dropper and cut off both ends; this makes a small rubber funnel. Place the small end of the funnel over the band and impression and the mould is complete. Cast the die with fusible metal. It is sometimes necessary to hold the rubber funnel on the band with pliers while casting, to make the rubber conform to the band when shaped to an elliptical or oval root, such as a cuspid or bicuspid. Trim the die if necessary with a knife or file. The cap may be swaged in a block of lead or by any of the swaging methods in use. A cap swaged by this method will be an accurate fit, and will cause little or no irritation to the gums when properly adjusted. The balance of the crown may be finished in the usual way, and when completed and set will be a source of satisfaction to patient and operator.—*Brief.*

ETIOLOGY, PATHOLOGY AND TREATMENT OF TROUBLESOME TOOTH SOCKETS. By M. I. Schamberg, D. D. S., M. D., Philadelphia. Read before the Philadelphia Academy of Stomatology, Nov. 22, 1904. Since man has been made aware of the worth of his teeth and the advisability of retaining them as long as possible, even at the expense of time, money and a moderate amount of physical pain, the number of unwarranted extractions has been materially reduced. Coincident with this laudable conservation of these important organs there is noted a tendency toward the retention for too long a period of teeth, the removal of which would prove a far better service to the patient. The wobbling molar with its pyorrheal socket, the uncured abscessed tooth with its fistulæ, the impacted third molar with its readily infected pocket, and the exostosed tooth with its disturbing influence upon the enveloping bone are all examples of cases which frequently come to the extractor at such a late date that a troublesome tooth socket is bound to follow. It is indeed unfortunate that just and prompt discrimination cannot always be made between the tooth that will grow well under treatment and the one whose inevitable loss is but a matter of time. It is, however, possible for each and every one of us to make up his mind to cure every

abscess, check the pus discharge in every pyorrheal case, brace every loose tooth, or cause these offending members to be removed before they have a chance to menace the health and longevity of their hosts.

I take this emphatic stand for the reason that I have observed many cases where the prolonged retention of diseased teeth has not alone endangered the integrity of the surrounding tissues, but has been the cause of constitutional disorders of serious import. The citation of an illustrative case might be of interest. Mr. H. presented for the treatment of an abscess upon the lower second molar. Examination of the mouth revealed a fistula upon the buccal aspect of the alveolus communicating with the distal root. Upon inquiry it was learned that the patient had noticed for two years or more a "small gum-boil" in this region. The usual history was obtained that the abscess filled from time to time and would then burst, discharging its contents into the mouth. During this time the patient had been a sufferer from frequent outbreaks of boils and carbuncles upon the neck and other parts of the body. He was treated both here and abroad for this distressing condition, yet no thought had been given the possible connection between this small alveolar abscess and the constitutional poisoning from which he was suffering. His trip abroad and the cures taken there improved his health, but he still suffered from an occasional boil. An effort made to cure the abscess failed because of an obstruction in the distal canal which interfered with its proper cleansing, whereupon the tooth was removed. Though a year has elapsed the patient has not had a recurrence of the boils and his health is much improved. There is little doubt that this general infection was due to the absorption of pus from the alveolar abscess, and that the patient might have been spared much needless suffering, inconvenience and expense had this tooth been removed a few years earlier. The review of this case could be followed by a number of others in which the gastro-intestinal tract and the entire system have suffered from the swallowing of pus formed within the mouth, from faulty mastication rendered so by loose and tender teeth, and from physical exhaustion due to prolonged suffering.

Thus far in this paper particular stress has been laid upon the baneful effects of the retention of diseased teeth upon the general

health. This is done to emphasize the necessity for removing such teeth unless they respond to treatment within a reasonable period of time. The removal of aching or sore teeth is almost invariably followed by prompt relief. The purpose of this paper is to consider clinically and pathologically the causes of those cases in which relief does not follow the extraction of a tooth. Attention will also be directed to the prevention and treatment of troublesome tooth sockets. For the purpose of systematically dealing with the subject, troublesome tooth sockets might be classified in the following manner:

- Traumatic Sockets.
  1. Injury to alveolar process.
  2. Laceration of soft tissues.
  3. Unremoved ends of roots.
- Dry Sockets.
  1. Interference with the formation of a blood-clot
     - through drugs.
     - through suppuration.
     - through hemophilic tendency.
  2. Dense alveolar walls
     - exostosis.
     - impaction.
     - peridental inflammation.
  3. Infection
     - preexisting: abscess, pyorrhea.
     - operative.
     - postoperative.

To adequately consider these various deviations from the normal requires a full understanding of the uneventful extraction of a tooth and healing of the socket without pathological interference. When a tooth is removed no greater local disturbance should be produced than the rupture of the peridental membrane and the pulp at the apex of the tooth, together with a moderate amount of spreading of the process made possible through the normal resiliency of that tissue. The bleeding which takes place should entirely fill the socket of the tooth with a well-formed clot. This clot is supposed to remain and form a matrix for the new cells which spring from the socket wall and rapidly spread until they have replaced the clot and caused its absorption. Most sockets heal in the manner just outlined. It must be remembered, however, that there are many conditions which tend to alter or interfere with this normal process of healing. Teeth do not always possess the ideal conformation, and are therefore not always re-

moved with as little trauma as characterizes the uneventful tooth extraction. Neither are all teeth free from affections which alter the surrounding structures sufficiently to prevent the normal repair. Again, the mouth of many patients and the instruments and hands of many operators are not always free from organisms which are ever ready to invade the socket and work their noxious effects. Lastly, a proportion of patients, however small, come to the extractor at a time when their lowered state of vitality tends to unfavorably influence the proper healing of the socket.

By *traumatic socket* is meant an injury to the socket produced during the extraction of a tooth in excess of the rupture of the peridental membrane and pulp and slight spreading of the process. The traumatic socket, next to the normal socket, is the one most often met with, but fortunately it seldom proves to be as troublesome as the dry socket.

1. *Injury to the alveolar process* constitutes a frequent variety of traumatic socket. It consists of an excessive spreading, crushing or fracture of the process. It may be due to the shape of the tooth, as noted in teeth with exostosed, curved or flaring roots, to an abnormal position of the tooth, to brittleness of the process, to its adherence to the tooth, to the necessity for crushing through the alveolus to dislodge a root, or to carelessness, haste or incompetence of the operator. This form of traumatism may cause the part to remain tender for some time, though it seldom, unless complicated by other conditions, causes excruciating or unbearable pain. Small forceps, elevators, the surgical bur, care and skill will often prevent excessive injury to the process. When the alveolus has been fractured loose pieces should be removed and the sharp edges made smooth, so as to cause as little irritation as possible.

2. *Laceration of the soft tissues* usually accompanies injury to the process, though it may occur independent of that complication. It consists of tearing and crushing the gum tissue, and may be due to the gum being adherent to the tooth, to the removal of a piece of process with gum attached, to grasping the gum with the forceps, to crushing through it to reach the root, and to the same faults of the operator as were mentioned in referring to process injury. Here the employment of small forceps, elevators and the lance will reduce the possibility of laceration to a minimum.

The soreness from injury to the gums seldom lasts very long, and the repair takes place with promptitude unless interfered with by continued irritation from projecting process or through suppuration.

3. *Unremoved ends of roots* are always barriers against the normal healing of a socket. Roots become fractured during extraction through efforts at hasty removal of teeth rather than a slow spreading of the process and a gradual dislodgment of teeth in the direction of least resistance. Exostosed, curved and frail roots are naturally prone to this mishap. Impaction, brittleness, excessive decay, density of the enveloping bone and non-yielding process are also conditions which predispose to this injury. Unremoved roots may or may not give trouble, much depending upon whether they contain exposed portions of vital pulp, abscesses at their apices, or other peridental disturbances.

It is always well to be sure of the presence or absence of the ends of roots. This may be accomplished by carefully examining every tooth removed, by the skilful use of the explorer, by swabbing the socket with a styptic so as to check all bleeding, by the use of a good electric mouth-lamp with a mirror to reflect the light into the socket, and by the use of the X rays when other methods fail. It is always best to remove every portion of each root, lest it immediately or eventually give trouble. Every root can be removed. The judgment of the operator must decide whether the end justifies the means. When it is decided to allow a portion of a root to remain until nature makes its removal an easier task the patient should be kept under observation, and upon the first indication of trouble occasioned by the retained root the same should be promptly removed.

By *dry socket* is meant one in which the normal blood-clot is absent. This term is a misnomer, for a socket is not necessarily dry though it be devoid of its blood-clot. The name is here used for want of a better means of designating the condition and because of its accepted usage.

1. *Interference with the formation of a blood-clot* is the usual cause of a dry socket, and may follow the use of drugs in the socket, may be brought about through suppuration, or may be the result of bleeders' diathesis. In each instance the clot fails to form and leaves the socket unprotected and open to the reception of

saliva and oral débris. Such sockets are usually painful, and can be best relieved by thorough cleansing with peroxid of hydrogen and packing with sterile boric acid or iodoform gauze, or with a tampon of cotton saturated with campho-phenique. This treatment must be applied until the walls of the socket are covered with a layer of healthy granulations, after which time the part is usually able to take care of itself.

In a communication received some time ago from Dr. Louis Jack he says, "Concerning the condition which has been designated 'dry socket,' my observations have led me to consider that it is most frequently caused by the use of such disinfectants immediately after extraction as have stopped the natural hemorrhage and thus prevented the formation of the protective coagulum. The effusion of lymph is also checked. This result has repeatedly occurred in healthy and clean mouths, and most frequently after the removal of third molars, more particularly of lower ones. This has been more the case when phenol sodique has been used. The consequence of this unprotected condition of the alveolus renders the process liable to severe irritation, presumably infective. The condition bears some relation to that of compound fracture. If the mouth has been disinfected with dioxid or permanganate of potash I can see no necessity for the use of active or irritating disinfectants in the sockets. My preference is for the use of the normal aqueous solution of either acetanilid or hydronaphthol in the form of spray. Neither of these interferes with coagulation, and the former has the advantage of arresting pain. A solution of two parts of the tincture of calendula to six parts of water, as a spray, is exceedingly useful in mild cases and is especially soothing where laceration takes place." This is deserving of weighty consideration, coming from such a trustworthy and experienced stomatologist. His allusion to the destruction of the protective coagulum by the application of phenol preparations, and the consequent production of a dry socket, is pertinent and offers food for thought to those who practice the invariable post-operative swabbing of the socket with a disinfectant. It was upon Dr. Jack's advice that I long since discontinued this practice, save in cases in which the existing disease of the socket necessitated active treatment.

2. *Dense alveolar walls*, such as are formed about exostosed and impacted teeth and those the seat of chronic peridental in-

flammations, are occasionally found to be the cause of dry sockets. This constitutes probably the most painful variety of troublesome tooth socket, for in such cases there is a total absence of bleeding in the socket and a complete denudation of the socket wall. The cancellated portion of the bone having been rendered dense there is little opportunity for granulations to spring from the socket wall. Such cases can be treated in a similar manner to those in which there is an absence of blood-clot from other causes, but a much longer time is required for the granulations to spread from the edges of the socket. By burring out the dense wall of the socket the cancellated bone is sometimes reached and more rapid healing made possible.

3. *Infection* of tooth sockets may be due to a preexisting alveolar abscess or pyorrhea, to the introduction of germs at the time of the removal of the tooth, and to the migration of organisms into the socket some time after the extraction. Most cases of alveolar pyorrhea and abscess are immediately benefited by extraction of the teeth involved. There is, however, a small proportion of cases in which the traumatism occasioned by the removal of the affected teeth aggravates the trouble for the time being. In such cases a thorough curetment of the diseased area, followed by cauterization with pure carbolic acid, usually brings relief. The socket should be then loosely packed and allowed to heal by gradually filling with granulations. If a clot be allowed to form over an infected area before complete drainage is effected an extension of the disease is likely to follow. Serious consequences have resulted from infections of the bone brought about in this way. An osteomyelitis so produced calls for an immediate and thorough burring out of the socket with careful antiseptic treatment. Orthoform applied to the socket will relieve the pain when carbolic acid fails.

Operative infection may be due to non-sterile instruments and to an unhygienic condition of the mouth. *Post-operative infection* is usually due to the latter cause. The gravity of infection thus produced will depend upon the character and number of the germs, their virulence, and the resistance offered by the tissues. Fortunately, the staphylococcic and streptococcic infections far outnumber the tetanic, erysipelatus, syphilitic and tubercular, but the bare possibility of such germs gaining access to the system through wounds created by tooth extraction warrants the utmost care as to

the sterilization of all instruments, the disinfection of the operator's hands, and the antiseptic treatment of the patient's mouth.

Miller (DENTAL DIGEST, January, 1904, p. 51) says, "I have found that the secretions of wounds produced by the extraction of teeth examined three or four hours after operation contain vast numbers of leucocytes, and that in many cases they are loaded down with bacteria." Farther on in this laudable contribution to dental literature he says, "The protective powers present in the mouth are not to be accounted for by any antiseptic action on the part of the saliva, but rather by the phenomenon of phagocytosis, by the struggle for existence, and probably by certain forces residing in the soft tissues which have not yet been investigated."

These observations by Miller warrant the conclusion that in the battle which is waged between the white blood corpuscles and the bacteria-laden saliva the defense against infection could be materially strengthened by the use of mouth-washes which would dispose of a proportion of the invading organisms. Permanganate of potassium 1 in 1,000 is the mouth-wash which I usually employ to precede extraction. It is not a pleasant-tasting wash, but is an excellent oxidizer, deodorizer and disinfectant, and if vigorous rinsing is encouraged the mouth can be rendered fairly sterile in a few moments. Staining resulting from its use can be promptly overcome by hydrogen dioxid, which makes a good supplementary wash because of its combined bleaching and antiseptic properties. I do not recommend permanganate of potassium to patients for use at their homes after extraction because of the deep staining that will follow its prolonged usage. Patients are much more likely to adhere to instructions if advised to use some pleasant mouth-wash, such as listerine, glyco-thymoline, or the one to which they are accustomed.

All instruments and appliances used during the removal of teeth, such as forceps, elevators, cotton-pliers, mouth-props, etc., should be thoroughly sterilized, preferably by boiling or by immersion in a formalin solution. The operator's hands should be thoroughly cleansed immediately prior to handling the patient, the use of warm water and a non-irritating soap being sufficient except where special precautionary measures are necessary, when the hands should be dipped in a 1 to 1,000 bichlorid solution or in an equally efficient wash. The extraction of a tooth being a surgical proce-

dure, its performance should be accompanied by similar precautions to those that are employed in general surgery. *In the light of our present knowledge of the prevalence of germs within the oral cavity, the failure to precede and supplement every operation within the mouth which entails the shedding of blood by antiseptic washing or douching should be stamped as unpardonable negligence.—International.*

BLEACHING TEETH. By J. P. Buckley, Ph. G., D.D.S., Chicago. In discussing the bleaching of teeth in this short article it is not my intention to enter into the chemistry involved in the discoloration problem. I desire, however, to repeat what I have tried to emphasize in this series of articles—that in treating any pulpless tooth one of the factors to be accomplished is to *preserve or restore* the color of the tooth structure.

There are three principal sources of the discoloration of teeth: pulp decomposition, remedial agents and metallic fillings, and the first is the greatest. Many teeth containing putrescent pulps are discolored before the patient presents for treatment. In those cases where the color is not lost the putrescent condition can be corrected and the color preserved by the rational method outlined in a previous article.

When a case presents for bleaching three pertinent questions suggest themselves. 1st. What has caused the discoloration? 2d. Can the tooth be successfully bleached? 3d. What method should we employ to restore the color? The general cause of the discoloration can usually be determined from the history of the case as related by the patient. Whether or not the tooth can be successfully bleached depends largely upon the cause of the discoloration and the condition of the tooth structure. The teeth which I attempt to bleach are those that have a good bulk of dentin which if restored to its original color can be protected by the remaining enamel and some filling material, preferably porcelain. I desire here to emphasize the fact that it is folly to expect a tooth to remain bleached unless the dentin is properly protected.

Having ascertained the cause of the discoloration, and believing that the condition of the tooth structure justifies us in attempting to bleach the tooth, we come to a very important question: What

method shall we employ for the purpose of restoring the color? All of the methods employed in bleaching teeth involve more or less chemistry. From a chemical viewpoint there are two general methods of bleaching teeth—oxidation and reduction. The first general method is of two kinds also—direct and indirect.

I.—Oxidation Method. 1. Direct.—By direct oxidation is meant the use of any agent or agents from which oxygen can be directly obtained. Such as (a) sodium dioxid (Na_2O_2); (b) 25 per cent ethereal solution of hydrogen dioxid (H_2O_2); (c) aluminum chlorid (Al_2Cl_6) and a 3 per cent aqueous solution of hydrogen dioxid.

2. Indirect.—By this method is meant the use of any agent or agents by which oxygen can be obtained indirectly. Such agents are employed as will liberate nascent chlorin (Cl), a chemically active gas which in the presence of moisture seizes upon a molecule of water (H_2O), abstracts the hydrogen (H), forming hydrochloric acid (HCl), and liberates the oxygen in the nascent condition—$H_2O + 2Cl = 2HCl + O$. Some of the agents used for this purpose are: (a) Aluminum chlorid and Labarraque's solution (Harlan); (b) chlorinated lime and acetic acid (Truman); (c) powdered alum ($Al_2K_2(SO_4)_4$) and Labarraque's solution.

In view of the fact that all of the agents used in the indirect method of bleaching depend upon the generation of oxygen for their efficiency, it can readily be understood that the direct methods are far more satisfactory. The fact also that HCl is a constant by-product in the indirect method, thereby creating an acid medium, adds to the objectionable features of this method, for manufacturers have recognized for years that better results can be obtained in bleaching feathers, wool, ivory, etc., when the bleaching process is carried on in an alkaline medium. This is likewise true in bleaching teeth. Believing then that the direct method is far superior to the indirect, I shall not detail the latter.

Before calling your attention to a method which I use almost exclusively, I desire to refer briefly to the reducing method. II. Reduction.—By a reducing method is meant the use of any agent or agents which will abstract oxygen from a compound containing it. The agent which has been suggested is a mixture of sodium sulphite (Na_2SO_3) and boric acid (H_3BO_3). This mixture

is placed within the tooth, moistened with water and hermetically sealed (Kirk). In some cases when the tooth has been discolored by remedial agents good results are obtained by this method.

I shall now direct your attention to the detailed use of sodium dioxid—a direct oxidizing agent and one which, if its chemical properties are known and its dental application understood, I believe to be the only rational method of bleaching teeth thus far suggested to the profession. Sodium dioxid is a rare chemical—not because it is difficult to manufacture, but because of the fact that in the past there has been very little demand for it. It is a yellow powder easily decomposed by water into caustic soda and oxygen. Much of the product procured from wholesale druggists labeled "sodium dioxid" is nothing but caustic soda. This accounts for the fact that many dentists try this method of bleaching and fail to get results. The fault is not with the method but with the powder used. In order that we might be able to ascertain the efficiency of the chemical, some years ago I devised a simple test for this purpose. In a clean dry test tube place about 1 Gm. (15 grs.) of the powder and to it add 1 or 2 cc. (15 or 30 m.) of water. If the chemical is efficient oxygen enough should be generated to kindle a glowing splinter held in the mouth of the tube. Having tested our chemical and found it to be sodium dioxid and not caustic soda, the next thing is to prepare the tooth. It is presumed that the case has been treated and the root filled with gutta-percha. The rubber dam should be adjusted if possible without the use of the steel clamp. The ligature should be wrapped twice around each tooth included in the dam, which should be at least two teeth on either side of the one to be bleached. The lower third of the root filling should now be removed with a good sized round bur—it being necessary for permanent results to bleach the tooth rootwise as far as possible. We are now ready to apply our bleaching agent. In using Na_2O_2 the best results can be obtained by placing the dry powder in the cavity. With a platinum broach or pointed glass instrument work the powder well up into the canal from which the filling has been removed. In some cases it is rather difficult to place the powder in the cavity. To overcome this difficulty a platinum matrix can be placed between the discolored and the adjacent tooth, letting it extend above or below the cutting edge as the case may be, when

white gutta-percha can be warmed and pressed against the lingual surfaces of the teeth included in the dam. This forms a pocket into which the powder can easily be placed, using a little gold or platinum spoon. Recently I have been making a paste of the powder and chloroform, in which it is insoluble, quickly packing the paste in the cavity, evaporating the chloroform, and leaving the dry powder where it is desired. Distilled water is now dropped upon the powder, causing a lively effervescence. It is my opinion that the ultimate success depends quite as much upon the *mechanical* removal of the coloring matter as upon the chemical destruction of it; therefore the tooth must be thoroughly washed after each application of the powder. Warm distilled water should be used in a strong syringe, letting a moist sponge absorb the water. The cavity is now dried and the process repeated, if necessary. Usually two or three applications are sufficient. When satisfactorily bleached a paste of precipitated calcium phosphate and distilled water is forced up into the root and burnished against all exposed dentin. This is thoroughly dried, the excess removed, and a light colored cement used to form a base for the final filling, which should be inserted before the rubber dam is removed.—*Review.*

PRINCIPLES OF NORMAL ARTICULATION APPLIED TO ARTIFICIAL TEETH. By Harold De Witt Cross, D. M. D., Boston. Read before the Massachusetts State Dental Society, 1904. In bringing to your attention the subject of normal articulation I am not unaware that there is considerably less interest taken in things relating to prosthetic than to operative dentistry. There is, however, great probability of our being called upon for several years to come to make artificial teeth, so that anything which promises to improve these is worthy of investigation.

That we may intelligently apply the principles of normal articulation to artificial teeth, it will be necessary to consider some of the conditions governing the articulation of natural teeth. They are firmly attached to each jaw by the alveolar process, and are arranged in what is called an anatomical or a compensating curve, the upper being double, while the lower is single. The greatest extent of this curve is located at about the mesial cusps of the

first molars, and the upper central incisors and first molars are the only points which will touch on a plane surface.

The cuspids in the normal curve are not the lowest, as they are so frequently arranged in artificial teeth, but only appear so because the festoon of the gum is higher, showing more of the neck of the tooth. Natural cuspids are frequently longer than is called for by a normal articulation, but in such instances if the remainder of the arrangement be normal the articulation soon wears it to the proper length—the cuspid as a rule being the first tooth to show the effects of mastication. This compensating curve is for the purpose of equalizing the articulation during the forward and lateral movements of the mandible.

The natural molars and bicuspids are rather large, most molars being twice the size of artificial ones, while the cusps are high and sharp, with flat surfaces forming the fissures, which are correspondingly deep and well defined. The bicuspids and molars are set at a slight angle to the median line. This inclination is present in both the upper and lower, is most marked in the second and third molars, and causes the palatal cusps of the upper and the lingual of the lower to extend to a higher and lower plane respectively. This, together with the compensating curve, permits of contact on the side where the condyle moves forward and downward during the lateral motions. The buccal cusps of the upper and the lingual of the lower are sharp, while the other two are dull, so that in each case a sharp cusp bears against a dull one.

There is an "overbite" of about one-eighth of an inch in the normal arrangement of the natural teeth, without which they would not be capable of exerting the "shearing" motion. It is this same incising motion, only doubled and with increased surface contact, that constitutes the grinding movements of mastication. The function of the incisors is still further increased by their edges, which from wear become chisel-shaped and very sharp.

Everyone is familiar with the normal occlusion, where each tooth, with the exception of the lower central incisors and the upper third molars, is in contact with two teeth, arranged as bricks are laid, with the joints broken. During occlusion also the "overbite" appears, and the condyles are at rest in their sockets.

Occlusion and articulation are words often used synonymously, but which should be made to express entirely different conditions.

"Occlusion" is passive and expresses rest, with the teeth in the position of a "back bite," while "articulation" carries the idea of motion, and may be used to describe the various relations sustained between the upper and lower teeth during the incising and grinding movements. While normal occlusion is very well known, there is not the same familiarity with a normal articulation, one reason being that it is not so often seen.

During the incising action the upper and lower incisors are in contact at their cutting edges, and there is also contact of the upper and lower third molars on each side. The contact of the incisors continues as the mandible is retracted till the teeth are nearly in occlusion, when they become slightly separated. There is contact of all the teeth, of both buccal and lingual cusps, from the central incisors to the third molars of the same side, during the grinding motion; while on the opposite side only the buccal of the lower third molar and the palatal of the upper are in contact. This arrangement provides that, within the normal range of motion of the mandible used in masticating and incising, there will always be contact on both sides of the mouth; this is in order that the strain of the muscles on the mandible may be equalized, and also permits of greater pressure being applied.

While the arrangement of the teeth determines to a great extent what their articulation will be, it is really the temporo-maxillary articulation that governs and permits the movements of the mandible—which are more varied and of greater number than those of any other joint of the body. This articulation is formed by the oblong, rounded head of the condyloid process of the mandible resting in the glenoid fossa or gliding forward on to the articular eminence. There are three distinct movements provided by this articulation, besides several combinations, and the hinge, the rotary, and the gliding motions are all used, either singly or in combination, during mastication. When the mandible is thrust forward, as in the incising action, the condyles glide forward on to the eminence, and during the grinding motion one condyle rests and rotates in its socket while the other glides forward as for incising.

As the articular eminence is at a lower plane than the glenoid fossa, it follows that whenever the condyle moves forward its line of motion must be downward also. This angle is normally about

30 degrees. If it were not for this dropping of the condyles there would be no occasion for a compensating curve and there could be no overbite, for the angle of descent of the condyles, the overbite, the length of the cusps, and the amount of compensating curve are all proportional; that is, a considerable drop of the condyles would demand high cusps and a distinct curve, while opposite conditions would exist when the eminence was lower.

It is only within a comparatively short time that much attention has been given to the so-called "anatomical" articulation of artificial teeth. To be sure, it was several years ago when Bonwill devised his anatomical articulator and laid down certain geometrical principles in regard to the arrangement of the teeth. It is safe, however, to say that he did not have many converts. His ideas seemed hard to grasp and, to many, equally useless to follow. The process of "setting up" is nearly always done on a "plain line" articulator, and is often considered of no especial importance, so long as there is contact of the teeth. At the best provision is made only for articulation in one position, while often the cusps are entirely ground away during the process; very few use rouge in connection with grinding for the articulation, so that the contact is of points rather than surfaces. Within a few years, however, a general interest has been manifested in anatomical articulation—which may be regarded as one sign of a higher standard in prosthetic dentistry, so that to-day a set of artificial teeth not only corresponds in size, shape, color and general characteristics with the age and temperament, but the teeth may also be arranged so as to permit one to masticate his food thoroughly and comfortably.

My purpose is to endeavor to show that artificial teeth arranged on an anatomical articulator according to the laws governing the natural teeth will restore, to a far greater extent than any other method, the principal function of the teeth—that of mastication. The whole idea of the anatomical arrangement is simply to apply the principles of normal, natural articulation to artificial teeth, namely, to use large bicuspids and molars, to make deep fissures and sharp cusps with flat surfaces, to provide for an overbite, and arrange the teeth in the compensating curve.

However, before passing to the consideration of the arrangement of artificial teeth, it will be well to note some of the conditions

under which they will be used. The plates, if entire ones, are retained in contact with the tissues of the mouth, in one case by atmospheric pressure, and in the other by gravity and tolerance of the surrounding muscles and tissues. This lack of stability is in contrast to the firmness with which the natural organs are held. Dr. Davis in an article on articulation quotes Black in regard to the relative amounts of force which natural and artificial teeth are capable of exerting. He says that from twenty to thirty pounds is the greatest pressure which can be obtained between the molars of an entire upper and lower set of artificial teeth, and with artificial above and natural below forty pounds of pressure are available; while between the natural teeth the jaws are able to give a crushing power of from one hundred and fifty to two hundred and seventy pounds. This table also gives the amount of force necessary to masticate very tender beef as from thirty-five to forty pounds.

The cusps of artificial teeth as commonly used are little, smooth, rounded "bunches," which are frequently ground flat in adjusting for the bite." These flat surfaces have no fissures to hold the food, and they are soon worn smooth. Considering the comparative instability of artificial teeth; the tremendous decrease of available force; the flat, smooth cusps; an arrangement which allows of only direct up-and-down, open-and-shut motion—a purely crushing force—is it not a wonder that more people who wear artificial teeth are not dyspeptics?

Articulators are instruments in which artificial teeth are adjusted. They are, in a sense, artificial jaws, and if the occlusion has been taken carefully the teeth will occupy the same relations in the mouth as in the articulator. Most articulators are provided with only one movement, possibly with the idea that it is easier for the person wearing artificial teeth to learn to restrict the natural chewing movements to that of the articulator, rather than that the possibilities of the instrument be extended. However, there is a saying that there is a use for everything in nature, and it is extremely doubtful if the Creator would have made the temporo-maxillary articulation as complicated as it is if a simple hinge would have answered equally as well.

A better name for the ordinary "plain line" articulator would be "occluder"—for that would indicate the only real purpose which it

serves. Teeth arranged in such an instrument will articulate only in the one position to which they were "set up." In the incising or grinding positions there is likely to be contact at only one point, which may be at the cuspids or bicuspids on one side, while there is none on the other, or the incisors will touch, leaving a space between the molars and allowing the plates to tilt. This tilting is more apt to occur when one begins to wear a plate, for after a time he learns to avoid these contact points, or he becomes accustomed to the plate, or learns to restrict the natural grinding motions of the mandible to a direct open-and-shut bite, and when this is accomplished the plates are said to "fit" perfectly.

It was the insistence on the part of one patient to have these single contact points removed that some six years ago first called my attention to the subject of articulation. For two years it was my habit to articulate the artificial teeth in the mouth as well as possible, by grinding until there was contact on both sides of the mouth. This was a tedious process for both patient and operator, requiring from one to two hours, and even then the cusps were usually so flat as to be of little use in chewing. With the hope of getting better results I constructed an anatomical articulator, and since then have used one or another of that design. It is obvious that if an instrument can be made which will correctly reproduce the movements of the mandible teeth can be arranged in it which will articulate in the mouth in any position in which they may be placed during the process of mastication. A correctly made articulator is, however, only one factor in the process; it is equally important that it be used correctly. The models must be placed in the proper relation to the condyles, and also with regard to the angles of the articular eminence, and the teeth must be arranged in a normal occlusion and articulation.

The proof of the correctness with which the natural movements of the mandible are reproduced is that models of natural teeth, set in an anatomical articulator, do articulate as the natural teeth themselves, also that artificial teeth "set up" in such an instrument give the same articulation in the mouth. The advantages of "natural" articulation of artificial teeth are the increased facility with which mastication and incision are performed; the improved appearance when arranged in a curve, and a distinct overbite, and the entire absence of tilting during any movement of the teeth.

When artificial teeth are arranged on these principles deep fis-

sures and correspondingly high and sharp cusps can be made, and they will articulate with no danger of the cusps interlocking to displace the plates. The idea of the compensating curve, the inclination of the molars, and a very short overbite, may be carried out by making only shallow cusps, but one will not be able to masticate as easily as with sharp, high cusps. Even for persons past middle age it is better to provide good sharp cusps on the bicuspids and molars, while the anterior teeth may be properly aged and still have a sharp overbite. If very narrow molars are used there is little opportunity to make deep fissures in them, and during the lateral swing of the mandible the cusps of the lower teeth may pass entirely beyond those of the upper and become locked. The normal lateral movement of the mandible is of a range equal to about the thickness of the buccal cusps of the teeth, or just sufficient to bring the lingual cusps of the upper teeth to bear on the buccal of the lower.

There are at present no teeth made which are just suitable for normal articulation, as they are all far too small, and it is necessary to do considerable grinding for fissures. The so-called "natural" forms or celluloid teeth are the nearest reproductions of the natural organs in the line of molded teeth, but there is still considerable to be desired.

The "normal" arrangement is easier to carry out when the entire upper and lower teeth are to be supplied, or when there remain in the mouth only the six anterior teeth; but the principles are equally applicable to partials, or to entire upper or lower cases. For partials it is often necessary to grind some of the remaining teeth a little, in order to correct an original faulty articulation or to overcome changes due to long extraction. Single teeth are of course much easier to arrange than are blocks, but by taking a little more time gum teeth can be adapted nearly as well.

A very important application of the principles of normal articulation is in relation to crown and bridgework. When crowns or bridges are made with reference to the occlusion only difficulties are very likely to arise in connection with the articulation, which it is necessary to relieve by grinding, or perhaps necessitating the remaking of the entire piece. Many crowns on anterior roots are loosened and fractured on account of lack of attention to the articulation. It is not essential that a full-sized articulator be used for crownwork, as there are small ones which answer nearly as well.

In using these, however, it is necessary to have casts of at least one-half of the mouth.

When teeth are to be arranged for a normal articulation the bite or occlusion is taken in the usual manner, except for using a little more care, as there should be no grinding necessary when the plates are finished. Then by means of the face-bow the relation of the model to the condyles is taken and transferred to the articulator. The bow also gives an approximate idea of the angles of the eminence. Suitable teeth are selected and set as nearly as possible to a normal arrangement. Dr. Gritman advises that the ten upper anterior teeth be first arranged, then the lower second bicuspids placed in proper relations with the upper, and afterward the remaining anterior teeth "set up" alternately toward the median line, then the lower molars are put in place, and lastly the upper molars. Whatever the order of arrangement may be, it is best to grind each tooth before it is put in place. A deep, square fissure is made in each bicuspid and molar, except the lower first bicuspids, where nearly all of the lingual cusps should be ground away. In the upper teeth the fissure is a little nearer the buccal, and in the lower nearer the lingual surface.

It is best to use as long bite teeth as possible, because they feel more natural to the patient, look more natural, and are better adapted for incising. The anterior teeth may be made chisel-shaped if desired, that they may cut through the food easier; but if they are adapted by a long overbite for the "shearing" motion there will be no difficulty in biting. The usual arrangement should be followed of placing the greatest bearing on the bicuspids and first molars, and in leaving a slight space between the upper and lower incisors.

The following is my method of arranging teeth for normal articulation: First, deep square fissures are ground in both the upper and lower molars and bicuspids; then, beginning with the central incisors, the upper teeth are set up alternately on each side till all are in place. The lower first bicuspids are next put in position, followed by the second bicuspids and the molars, and lastly the lower incisors. It is frequently necessary to narrow these incisors in order to have the proper overbite. The compensating curve and inclination of the molars must be kept in mind during the setting up, and after all the teeth are in place with a good occlusion the articulation or lateral movements should be tried, and

the teeth ground or moved as may be necessary to obtain a perfect articulation. If the teeth in the masticating side come in contact before those on the balancing side it shows either that there is not sufficient curve or inclination or that the fissures are not deep enough; while on the other hand, should the balancing side come in contact first it shows that the fissures are too deep, provided that the curve and inclination are right. A very little practice enables one to determine just where the trouble is.

It is always advisable to try the teeth in the mouth, to determine if any changes are needed; but it is *not* necessary to try the articulation, for if the occlusion be correct, and the models are properly set in the articulator, there is very little doubt that when the plates are finished the articulation will be correct also. As there is some "give" to the temporo-maxillary joint, it adapts itself to the conformation of the teeth as a rigid articulator will not, so that after making allowance for this adaptation it is seldom necessary to do more than touch a cusp or two and the articulation will be perfect, and the patient can be dismissed with good assurance that he will not need to return in a day or two with the complaint that in "biting" here or "chewing" there the plates tip—making it a question whether food or teeth are being chewed.

More time is needed to arrange teeth on normal principles, but considering their increased utility, and the fact that when once carefully made they are almost sure to be successful, it is time and pains well spent, from the standpoint of the dentist as well as of the patient.

Three entire sets of teeth were made for the same person in order to determine if there was any advantage of the "normal" over the "plain line" arrangement. I am indebted to a medical man for the experiments, as it was for him that the plates were made, and he was interested as much for scienec as for himself. Tests were made with definite-sized pieces of Scotch oatcake and peanuts, giving the number of bites required with the different plates as compared with the use of natural teeth. The result obtained from a large number of experiments was as follows:

	"Plain line."	"Anatomical" with deep fissures.	"Anatomical" with flat cusps.	Natural teeth.
Oatcake	33 bites.	27 bites.	25 bites.	24 bites.
Peanuts	34 bites.	27 bites.	30 bites.	24 bites.

While the anatomical arrangement shows advantage over the plain line in the mastication of bread and similar substances, the flat cusps work as well but no better than the sharp ones, but when used to masticate beef the flat arrangement was at a *decided* disadvantage, as in doing this the beef was involuntarily brought forward to the cuspid region so as to use the somewhat sharp cusps. The uniform comparison of the mastication of beef is difficult, but the results both in this and in many other cases show conclusively that in the majority of cases one can masticate it with nearly the same number of bites that are required with the natural teeth.

Normal articulation is not a panacea for all the ills of plate work; it will not make a poor model good, nor correct a wrong occlusion; it will not prevent the necessity of grinding the teeth if the flask be not closed for vulcanizing, nor give a plate "suction" when the model has been cracked by too great pressure; but by using the face-bow the models will be placed in correct relation with the condyles, so that the bite can be opened without causing the molars to be "set up" so long as to necessitate grinding one-half of the tooth away in order that the anterior teeth may occlude in the mouth, and the teeth will articulate in such a way as to assist in holding the plates in place rather than to dislodge them, and will allow of the easy mastication of tough foods.—*Cosmos.*

RESORPTION OF THE ROOTS OF PERMANENT TEETH. By Otto E. Inglis, D.D.S., Philadelphia. By resorption of the roots of permanent teeth is meant the gradual removal of the cementum and dentin of permanent roots of phagocytic cells existing in the adjacent soft tissue. (Osteoclasts.)

Causes.—The proximate cause is probably in all cases a degree of irritation greater than that required to produce hypercementosis. Talbot's demonstrations upon interstitial gingivitis, a term meant to include interstitial pericementitis, show that it is a frequent cause of both root and alveolar resorption. The disease has been discussed by other writers as a result of "rarefying pericementitis." Chronic apical abscess seems to be a frequent cause. Although theoretically the alkaline pus formed should neutralize acid formation, the fact of resorption remains and is probably explained upon

the ground that it is produced by the granulation tissue formed about the root apex during periods of lessened pus formation.

Protruding root fillings or broaches are common causes. Plantations are frequently followed by it. Looseness of a tooth with the resultant excess of movement excites interstitial gingivitis. Partial luxation as the result of a blow or fall produces the same result, the pericementum becoming thickened, the tooth loosened and extruded, and malocclusion, which is also a cause, being induced. A toothpick broken off in the gum tissue has produced resorption at the neck of the root.

The descent of a supernumerary or impacted tooth upon a permanent root has caused resorption, exposing the pulp of the resorbed root and producing pulp reactions. This may be quite extensive before violent symptoms occur. Calculus beneath the gum margin has produced resorption. In one case noted four lower incisors presented the characteristic bays at a point one-eighth inch below the gum line.

Some of the cases exhibit no tangible cause; the root resorbs apparently as the result of a peculiar reaction upon the part of the tissues of the individual, who may lose many teeth by this process—*i. e.*, a dyscrasia exists. The teeth may be non-carious and the pulps vital. In some of these cases neurasthenia or a uric acid diathesis seem to have some association with the condition.

Pathology and Morbid Anatomy.—Both resorption of cementum and its redeposition occur in teeth as physiological processes; at some aspect of the cementum the tissue becomes hollowed out, and later filled in by new cementum. Resorption of tissues throughout the body is accomplished by means of multinucleated cells (giant cells, osteoclasts). At some part to be physiologically resorbed these cells make their appearance in contact with the tissue to be removed, and it gradually disappears, the layer of multinucleated cells constantly occupying the excavated territory.

If a foreign (aseptic) body be introduced into living tissues it becomes surrounded by these cells, which in some cases effect its removal; in others, failing to remove the foreign body, connective tissue forms about it and encysts it; encystment may occur after partial removal by giant cells.

The resorption may be of any extent, from a slight spicular roughness of the apex of the root to almost complete removal of the root.

Perforation of the root from side to side may occur, of course, involving the pulp canal, and if the pulp be alive obscure reactions upon its part may occur.

An area of marked resorption may occur at a point just beneath the gum margin and upon any aspect of the tooth. In this situation it may simulate a cavity of decay beneath the gum. It occurs upon either vital or devitalized teeth and may expose the pulp or the root-canal filling. After plantations peculiar resorptions over even the entire root may occur. It is probable that in plantations the root is regarded as an aseptic foreign body; mild inflammation occurs, subsides, and giant multinucleated cells attack the tooth root and endeavor to remove it by solution; this they accomplish in part in spots; then a tolerance is established and connective tissue organizes about the roots; later more complete regeneration is represented in the formation of bone; a condition of bony fixation is established, evidenced by the clear-ringing note elicited upon tapping the planted tooth.

The inflammatory reaction and resorption are least when replantation is practised, but may at times be pronounced in even those cases. If the socket of a tooth extracted for resorption be examined a mass of soft tissue will be found occupying the locations corresponding to the areas of resorption. These soft masses correspond to granulation tissue. No acid reaction can be detected with litmus paper, but it is nevertheless probable that the cells producing resorption excrete an acid capable of dissolving the tissue. There is some evidence of this in cases of enamel resorption occurring upon the crowns of impacted teeth which have never been in relation with the oral fluids, and about which there is no evidence of caries in the areas of dentin resorption also present. In the fortunate specimens of these cases a superficial decalcification of the enamel surface may be seen which can occur only as the result of acid action.

Symptoms and Diagnosis.—The tooth may present symptoms of non-septic pericementitis, and may be loosened in advanced cases. In the early stages no looseness may be observed until a strain suddenly applied causes a luxation, and thereafter the tooth progressively loosens. The condition may be discovered by accident; evidences of mild pericementitis appear and the pulp canal is opened to search for a cause. The pulp may be found alive; if alive and it is killed, or if it is found dead, broaches pass suddenly into the

mass of soft tissue underlying the root. The progressive loosening of the tooth, with its peculiar movement, is about the only constant symptom of the condition.

In cases of live pulp this organ may be hyperemic, so that increased response to heat or cold is felt; this, taken in connection with the tenderness upon percussion which can usually be elicited, and with the peculiar loosening of the tooth, is a diagnostic guide.

Flagg states that reflex neuralgias occur in this condition, but that the most constant indication noted by him was a sense of discomfort about the jaws, vaguely associated with some one tooth. The patient is convinced that if the tooth were removed relief would follow. In the absence of the loosening which may not occur until the root is nearly gone, the resorption is most commonly discovered by entering the pulp canal and finding its length much shortened. In some cases the resorption may be found near the gum margin and simulating a cavity of decay, from which it may readily be diagnosed by its appearance when exposed by packing the gum away. Such cases appear to accompany a marginal gum resorption. The X-ray should exhibit the condition with sufficient clearness to furnish an absolute diagnosis.

Treatment.—If a direct diagnosis can be made the tooth should be extracted, except in the cases near the gum, which may be filled usually with plastic fillings. If a diagnosis be not possible, probable causes of irritation should be sought for and removed and the nonseptic pericementitis treated as indicated. Failing a cure the tooth is to be removed, when a diagnosis may be made. In view of the availability of the X-rays this involves an unnecessary endurance and loss of time—*Stomatologist.*

MENTHOL CRYSTALS.—Sometimes in operating for pyorrhea the tissues are sensitive. It may not be advisable in a given case to employ cocain, on account of contraindications. In such cases pack the pyorrhea pockets with menthol crystals a few minutes in advance of the operation. It will be found a great relief to the patient, and is in every way a more pleasant application than cocain.—E. D., *Review.*

SODIUM CHLORID AFTER APPLICATION OF SILVER NITRATE TO MUCOUS MEMBRANES.—Walter Griess (*Therapeutic Gazette*) advocates the use of a solution of sodium chlorid after the application of silver nitrate to any of the mucous membranes. By so doing he does away with the great discomfort to the patient resulting from the use of this drug in the usual manner.

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

ATTEND THE NATIONAL OR THE CONGRESS, OR BOTH.

July offers the dental profession an embarrassment of riches, with the Lewis and Clark Dental Congress meeting at Portland, and the National Dental Association meeting at Buffalo a few days later. While the Congress will not have the advantages accruing from the attendance of dentists from other countries, its program compares very favorably with last year's International Dental Congress. Considering the disadvantages under which the promoters of the Congress labored because of the remoteness of the meeting place, they deserve a large measure of credit for the excellent and comprehensive list of essayists, clinicians and exhibitors presented. This is an opportunity which no progressive dentist can allow to pass by, for aside from the educational benefits which he cannot help receiving, the trip is a delightful one and the expense will be small, as unusually low rates have been secured on all railroads.

Attendance on the Congress need not and should not preclude attendance on the National, for the former closes in plenty of time to enable its members to reach the latter. The National gives promise of having the best meeting in its history, as the program surpasses anything previously offered, the clinical features being especially comprehensive and valuable. The National Dental Association is the representative organization of the dental profession of this country, and as such should have the hearty support of every dentist who takes an interest in the welfare of his profession.

ILLINOIS' NEW DENTAL LAW.

We publish herewith a copy of the new dental law enacted at the last session of the Illinois legislature. While the body of law-

makers which recently adjourned killed in committees some meritorious bills, and let a few poor ones slip through, it was probably the best legislature this state has had in some time, and one of the wisest and most creditable acts which it enacted was this dental bill. It must not be imagined, however, that the bill was put through without effort, for a certain class of dental practitioners evinced opposition to it from the start and brought every influence to bear on their legislators to defeat it. It was introduced by Senator A. C. Clark, and his efforts for the bill never ceased until its passage was assured. This is the second time that he has tried to secure the passage of a meritorious dental law, and the dental profession and the people of this state are greatly indebted to him for his efforts on behalf of better dental legislation. There was danger for a time that Governor Deneen would veto the bill, as strong pressure was brought to bear on him by the advertisers, but it was during his term of office as state's attorney that the scandal of the then state dental examining board and of the fake dental colleges was aired in the courts, so he recognized the need of more efficient dental legislation for Illinois and signed the bill. Much of Illinois' bad reputation in the past was due to lax dental laws and to the fact that neither enough power nor financial assistance was given the Board. The present law remedies these defects, and as a matter of fact grants so much power to the Board that it is more essential than ever that only the most trustworthy and efficient men be appointed thereon. The proper enforcement of this law will put Illinois in the front rank and remove the stigma put upon her good name in years gone by.

AN ACT TO REGULATE THE PRACTICE OF DENTAL SURGERY AND DENTISTRY IN THE STATE OF ILLINOIS AND TO REPEAL AN ACT THEREIN NAMED. INTRODUCED BY SENATOR A. C. CLARK.

SECTION 1. *Be it enacted by the People of the State of Illinois represented in the General Assembly:* That a Board of Examiners, to consist of five practicing dentists, to be known as the Illinois State Board of Dental Examiners, is hereby created, whose duty it shall be to carry out the purposes and enforce the provisions of this act, as hereinafter specified. The members of said board shall be appointed by the Governor, and at the time of their appointment upon said board must be actual residents of the State and must

have been, for a period of five years or more, legally licensed to practice dentistry or dental surgery in this State: *Provided, however,* that no person shall be eligible to appointment to said board who is in any way connected with or interested in any dental college or dental department of any institution of learning. The term for which the members of said board shall hold office shall be five years: *Provided,* that the members of the dental board, in office at the time of the passage of this act, shall be permitted to serve out their respective terms of office for which they were appointed, and until their successors shall be duly appointed. In case of a vacancy occurring on said board, such vacancy shall be filled by the Governor, as herein provided.

SECTION 2. Said board shall choose one of its members president and one secretary thereof, and it shall meet at least once in each year, and oftener, if necessary, in the discretion of the board, and at such time and places as it may deem proper. A majority of the members of said board shall, at all times, constitute a quorum, for the transaction of the business of the board, and the proceedings thereof shall, at all reasonable times, be open to public inspection.

SECTION 3. No person, unless previously registered or licensed to practice dentistry in this State at the time this act shall become operative, shall begin the practice of dentistry or dental surgery, or any branches thereof, without first applying for and obtaining a license for such purpose from the Illinois State Board of Dental Examiners. Application shall be made to said board in writing, and shall, in every instance, be accompanied by the examination fee of twenty dollars ($20), together with satisfactory proof that the applicant is of good moral character and twenty-one years of age or over at the time of making the application. Application from a candidate who desires to secure a license from said board to practice dentistry or dental surgery in this State shall be accompanied by satisfactory proof that the applicant so applying for a license has been engaged in the actual, legal and lawful practice of dentistry or dental surgery in some other State or country for five consecutive years just prior to application; or is a graduate of and has a diploma from the faculty of a reputable dental college, school or dental department of a reputable university; or is a graduate of and has a diploma from the faculty of a reputable medical college or medical

department of a reputable university, and possesses the necessary qualifications prescribed by the board. When such application and the accompanying proofs are found satisfactory, the board shall notify the applicant to appear before it for examination at a time and place to be fixed by the board. Examination may be made in whole or in part, orally or in writing, at the discretion of the board, and shall be of a character as to test the qualification of the applicant to practice dentistry or dental surgery. All examinations provided for in this act shall be conducted by the board, which shall provide for a fair and wholly impartial method.

SECTION 4. Said Board of Dental Examiners shall make rules or regulations to establish a uniform and reasonable standard of educational requirements to be observed by dental schools, colleges or dental departments of universities, and said board may determine the reputability of those by reference to their compliance with said rules or regulations.

SECTION 5. Any person shall be regarded as practicing dentistry or dental surgery within the meaning of this act, who shall treat or profess to treat any of the diseases or lesions of human teeth or jaws or extract teeth, or shall prepare any fill cavities in human teeth or correct the malposition of teeth or supply artificial teeth as a substitute for natural teeth; *Provided,* that nothing in this act shall be so construed as to prevent regularly licensed physicians or surgeons from extracting teeth. Further, this act shall not prevent students from performing dental operations under the supervision of competent instructors within a dental school, college or dental department of a university recognized as reputable by the Illinois State Board of Dental Examiners.

SECTION 6. Any person licensed to practice dentistry or dental surgery in this State by the Illinois State Board of Dental Examiners, as hereinbefore provided, shall personally, and within ninety days from date of issue, cause such license to be registered with the county clerk of such county or counties in which such person desires to engage in the practice of dentistry or dental surgery, and the county clerks of the several counties of this State shall charge for registering such license a fee of twenty-five cents ($0.25) for each registration. And it is hereby provided further that any person who engages in the practice of dentistry or dental surgery in this

State shall cause his or her license to be registered with the county clerk before beginning the practice of dentistry in said county, and to be all times displayed in a conspicuous place in his or her office wherein he or she shall practice such profession, and shall further, whenever requested, exhibit such license to any of the members of the said board or its authorized agent.

SECTION 7. The board may refuse to issue the license provided for in this act, or may revoke such license if issued to individuals who have, by false or fraudulent representations, obtained or sought to obtain practice, or by false or fraudulent representations obtained or sought to obtain money or any other thing of value, or have practiced under names other than their own, or for any other dishonorable conduct. The board, when written charges have been filed with its secretary and seem sustained by proof, shall fix a time and place for the examination of a person so charged and shall give written notice to the said person of the time and place and furnish him with a copy of the charges at least twenty days prior to the date fixed for the examination.

SECTION 8. Any failure, neglect or refusal on the part of any person obtaining a license to practice dentistry or dental surgery from the said board to register such license with the county clerk of some county in this State, as above directed, within ninety days from the date of issue of the same, shall work a forfeiture of such license, and no license, when once forfeited, shall be restored except upon payment to the said board of the sum of fifteen dollars ($15) for such neglect, failure or refusal to register such license and the surrender of forfeited license.

SECTION 9. In order to provide the means for carrying out and enforcing the provisions of this act, the said board shall charge each person applying to it for examination for a license to practice dentistry or dental surgery in this State an examination fee of twenty dollars ($20), and in addition thereto a license fee of five dollars ($5.00), for every license or duplicate issued by said board, and out of the funds coming into the possession of the board under the provisions of this act the members of the said board shall each receive as compensation the sum of ten dollars ($10) for each day actually engaged in the duties of the office and all legitimate and necessary expense incurred in attending the meetings of the said

board; *Provided* that the secretary of the board, for the purpose of enforcing the provisions of this act, shall receive a salary to be fixed by the board, instead of the per diem of ten dollars ($10). All expenses shall be paid from the fees, fines and penalties received and recovered by the board under the provisions of this act; *Provided* that no part of said expense shall be paid out of the State treasury. All moneys received in excess of said per diem allowance and other expenses herein provided shall be held by the secretary of the said board as a special fund for meeting expenses of said board, and said board shall make an annual report of its proceedings to the Governor on the 15th day of December of each year, together with an account of all moneys received and disbursed by them pursuant to this act.

SECTION 10. Any person filing or attempting to file as his own the diploma or license of another, or a forged affidavit or identification or qualification, shall be deemed guilty of a felony, and upon conviction thereof shall be subject to such fine and imprisonment as is made and provided by the statutes of this State for the crime of forgery.

SECTION 11. Any person who shall practice dentistry in this State without being registered or without a license for that purpose, or violates any of the provisions of this act, shall be subject to prosecution before any court of competent jurisdiction upon complaint, information or indictment, and shall, upon conviction, be fined for each offense in any sum not less than fifty dollars ($50) nor more than two hundred dollars ($200). All fines imposed and collected under this act shall be paid to the Illinois State Board of Dental Examiners for its use.

SECTION 12. All licenses issued by the said board shall be signed by all of the members thereof and be attested by its president and secretary.

SECTION 13. An act to insure the better education of practitioners of dental surgery and to regulate the practice of dentistry in the State of Illinois, approved May 30, 1881, and in force July 1, 1881, and all other acts and parts of acts amendatory thereto, and hereby repealed; *Provided,* however, that such repeal shall in no wise affect any suit, prosecution or court proceeding pending at the date of the passage of this act.

Notices.

ARIZONA BOARD OF DENTAL EXAMINERS.

The Arizona Board of Dental Examiners will meet in Bisbee for the examination of candidates July 17-19, 1905. The fee is $25.

W. P. SIMS, Secy., Bisbee.

MAINE STATE DENTAL SOCIETY.

The fortieth annual meeting of the Maine State Dental Society will be held at Portland, July 18-20, 1905. A cordial invitation is extended to the profession to meet with us.

GEORGE E. DOW, Chairman Ex. Com., Portland

ELGIN (N. B.) DENTAL SOCIETY.

The Elgin (N. B.) Dental Society held its annual meeting June 3, 1905, and elected the following officers: President, F. E. Bennett; Vice-President, F. J. Fear; Secretary and Treasurer, C. C. Lumley.

DETROIT COLLEGE DENTAL ALUMNI ASSOCIATION.

The annual meeting of the Alumni Association of the Dental Department of the Detroit College of Medicine was held at Detroit, June 8, 1905, and the following officers were elected: President, F. W. MacDonald; Secretary and Treasurer, W. A. Giffen; Historian, C. J. Gray; Editor, T. J. Collins.

CALIFORNIA UNIVERSITY DENTAL ALUMNI ASSOCIATION.

The annual meeting and clinic of the Alumni Association of the Dental Department of the University of California were held at San Francisco, May 25-26, 1905, and the following officers were elected: Secretary, T. R. E. Keep; Recording Secretary, George T. McDaniel; Treasurer, Francis O. Robinson.

COLORADO STATE DENTAL ASSOCIATION.

The Colorado State Dental Association held its annual meeting at Colorado Springs, June 21-22, 1905, and elected the following officers: President, W. T. Chambers, Denver; Vice-President, J. Allen Smith, Colorado Springs; Secretary, B. Frank Gray, Colorado Springs; Treasurer, William Smedley, Denver. The next annual meeting will be held at Denver.

BOSTON AND TUFTS DENTAL ALUMNI ASSOCIATION.

The annual meeting of the Boston and Tufts Dental Alumni Association was held June 14, 1905, and the following officers were elected: President, Irving J. Wetherbee; 1st Vice-President, George T. Baker; 2d Vice-President, Ervin A. Johnson; Recording Secretary, Marion L. Woodward; Corresponding Secretary, George B. Squires; Treasurer, Wm. Rice; Editor, James R. Piper; Executive Committee, W. I. Brigham, Fred B. Stevens, Wm. M. Flynn, Clarence A. Pettingill.

FIRST DISTRICT DENTAL SOCIETY OF ILLINOIS.

The First District Dental Society held its annual meeting at Bloomington, June 12, 1905, and the following officers were elected: President, J. D. Brown; Vice-President, J. R. Piper; Secretary, J. S. Reece; Treasurer, M. D. Young; Executive Committee, J. W. Kasbeer, Harry Stevenson, B. Newsome.

MASSACHUSETTS STATE DENTAL SOCIETY.

The Massachusetts State Dental Society held its annual meeting at Boston, June 7-8, 1905, and elected the following officers: President, John F. McLaughlin, North Adams; 1st Vice-President, M. C. Smith, Lynn; 2d Vice-President, George E. Savage, Worcester; Secretary, Chas. W. Rogers, Dorchester; Assistant Secretary, Robert Whitehill, Cambridge; Treasurer, John W. Estabrooks, Boston.

MINNESOTA UNIVERSITY DENTAL ALUMNI ASSOCIATION.

The annual meeting and banquet of the Alumni Association of the College of Dentistry of the University of Minnesota were held June 2, 1905, at Minneapolis, and the following officers were elected: President, Homer Taylor, Warren; Vice-President, George E. Hourn, Lanesboro; Secretary, and Treasurer, Edwin Wanous, Minneapolis; Historian, Mary Hartzell; Member Board of Directors, F. E. Moody.

FLORIDA STATE DENTAL SOCIETY.

The Florida State Dental Society held its twenty-second annual meeting at Seabreeze, June 1-2, 1905, and elected the following officers: President, Guy C. Estes, Palatka; 1st Vice-President, C. F. Kemp, Key West; 2d Vice-President, R. E. Chafer, Miami; Corresponding Secretary, C. H. Frink, Fernandina: Recording Secretary, G. Enloe, Miami: Treasurer, B. G. Barnett, Arcadia.

MISSOURI STATE DENTAL ASSOCIATION.

At the fortieth annual meeting of the Missouri State Dental Association, held in St. Louis, May 24-26, 1905, the following officers were elected: President, W. M. Carter, Sedalia; First Vice-President, F. H. Achelpohl, St. Charles; Second Vice-President, F. G. Worthley, Kansas City; Recording Secretary, H. H. Sullivan, Kansas City; Corresponding Secretary, Sam T. Bassett, St. Louis; Treasurer, J. T. Fry, Moberly. Board of Censors, J. C. Pasqueth, Mexico; J. L. Bridgeford, Macon; DeCourcey Lindsley, St. Louis. Committee on Ethics, J. B. McBride, Springfield; A. J. Prosser, St. Louis; F. M. Fulkerson, Sedalia. Committee on Publication, Otto J. Fruth, St. Louis; J. W. Hull, Kansas City. Committee on Inventions and New Appliances, Ralph H. McCrum, Springfield. Committee on History of Missouri State Dental Association, Burton Lee Thorpe, St. Louis. Time and place of next meeting, May, 1906, Springfield, Mo.

SAM T. BASSETT, Cor-Secy.

SOUTH DAKOTA STATE DENTAL SOCIETY.

The South Dakota State Dental Society held its annual meeting at Mitchell, June 2-3, 1905, and elected the following officers: President, H. H. Jackson, Flandreau; Vice-President, J. D. Wilson, Miller; Secretary, W. F. Price, Vermilion; Treasurer, Chas. McDowell, Alexandria.

SUSQUEHANNA DENTAL ASSOCIATION.

The annual meeting of the Susquehanna Dental Association was held at Harvey's Lake, Pa., June 2, 1905, and the following officers were elected: President, O. H. Uhler, Allentown; Vice-President, Walter H. Fordham, Scranton; Recording Secretary, T. W. Thomas, Wilkesbarre; Financial Secretary, George C. Knox, Scranton; Treasurer, J. C. Hertz, Easton.

MICHIGAN STATE DENTAL ASSOCIATION.

The forty-ninth annual meeting of the Michigan State Dental Association will be held at Detroit, July 10-12, 1905. An unusually attractive program has been provided, and the entertainment features as arranged by the Detroit Dental Society are very complete. The profession is cordially invited to meet with us.

A. L. LeGro., Secy., Three Rivers.

"F. D. I." INTERNATIONAL DENTAL FEDERATION.

The President of the F. D. I. desires the announcement to be officially made that the meeting called to convene in Hanover on August 7 is not to be a general meeting, but simply a meeting of the Executive Council and of the several Commissions.

The following business will be transacted: 1. Report of the President. 2. Reports of the various national committees on recent actions taken in their respective countries in the matter of public dental hygiene and dental education. 3. Determination of the relation of the F. D. I. to the various national committees. 4. Relation of the national committees to the representative bodies of their respective countries. 5. Qualification for membership in certain cases where difference of opinion may arise. 6. The question of the advisability of publishing a pamphlet on the care of the teeth in such form as to be made accessible to the poorer classes. 7. The question of the possibility of manufacturing a tooth-brush at a price which will put it within the reach of the poorer classes. (Haderup.) 8. A discussion of the question: In what lines is the activity of the F. D. I. to be developed in the immediate future?

The Commissions thus far established by the F. D. I. are: 1. The International Commission on Education. 2. The Commission on Hygiene and Public Dental Service. 3. The Commission on the International Press. 4. The Commission on Jurisprudence and International Ethics.

To be organized: The Commission on Nomenclature.

Edward C. Kirk, Secretary-General.

MONMOUTH COUNTY (N. J.) DENTAL SOCIETY.

The Monmouth County (N. J.) Dental Society was organized at Asbury Park, June 9, 1905, and the following officers were elected: President, A. S. Burton; Vice-President, Fred Burdge; Secretary, H. S. Taylor; Treasurer, G. L. D. Tompkins; Executive Committee, Byron L. Rhome, Thomas Pratt, G. L. D. Tompkins.

NORTHERN OHIO DENTAL ASSOCIATION.

The Northern Ohio Dental Association held its annual meeting at Cleveland, June 5-6, 1905, and elected the following officers: President, H. L. Ambler, Cleveland; Vice-President, J. R. Owens, Cleveland; Corresponding Secretary, H. H. Zeigler, Cleveland; Recording Secretary, J. K. Douglas, Sandusky; Treasurer, D. A. Allen, Toledo.

MINNESOTA STATE DENTAL ASSOCIATION.

The Minnesota State Dental Association held its annual meeting at Minneapolis, June 1-3, 1905, and elected the following officers: President, J. F. McCrea, Minneapolis; Vice-President, W. A. Demo, Blue Earth City; Secretary, F. E. Cobb, Minneapolis; Treasurer, H. M. Reid, Minneapolis. The next meeting will be held at Minneapolis.

UTAH DENTAL ASSOCIATION.

The Utah Dental Association held its fifteenth annual meeting at Salt Lake City, June 16-17, 1905, and elected the following officers: President, B. M. Smith, Ogden; 1st Vice-President, W. M. Stookey, Lehi; 2d Vice-President, G. B. Terrell, Salt Lake; Secretary and Treasurer, A. D. Barbour, Ogden. The next annual meeting will be held at Ogden.

NATIONAL DENTAL ASSOCIATION—SECTION TWO.

The following program will be offered for the consideration of this Section in Buffalo, July 25-27, 1905:

J. V. Conzett, Dubuque, Ia. "Gold as a Filling Material."

B. L. Thorpe, St. Louis. Lantern Lecture—"Pioneer Manipulators of Gold Foil."

Chas. Milton Ford, New York City. "Dental Education."

W. R. Clack, Clear Lake, Ia. "The Necessity for a Method of Preserving the Integrity of the Interproximal Space."

D. O. M. Le Cron, St. Louis. "A Few Experiments in Porcelain."

D. W. Fellows, Portland, Me. "A Century of Standard Dental Writings."

B. Holly Smith, Baltimore. "Operative Dentistry."

S. H. Guilford, Boston. "The Nomenclature of Orthodontia."

Wm. H. Potter, Boston. "The Use of the Summer Vacation in the Education of the Dental Student."

I. J. Wetherbee, Boston. "Tin and Gold; Its Possibilities and Uses as a Filling Material."

HOWARD E. ROBERTS, Chairman, Philadelphia.

NATIONAL DENTAL ASSOCIATION—CLINIC SECTION.

It is not possible for the Secretary of the Clinic Section to do more than give the names of the clinical operators, as well as a general outline of the work which will be done at Buffalo, on July 26 and 27, for the consideration of the members of the National Dental Association. There is not a department of dentistry which has been overlooked. Indeed, it can be said that the members on the committee have attempted to obtain the most diversified number of chair and table clinicians possible to bring together. To begin with, there will be two surgical operations of a major order. There will also be several of a minor nature, such as surgical treatment for alveolar abscess and conditions of pyorrhea. Somnoform, narcotile, and nitrous oxid and oxygen will have their advocates present, and the use of these different agents will be fully demonstrated. Those interested in porcelain will have a chance to see porcelain inlays made, as well as the construction of porcelain crowns and bridges. There will be any number of operations made with gold by the members of the Black Club and other men. There will be operations made with amalgamated gold, amalgam, tin, etc. A number of gentlemen will also demonstrate crown and bridge operations. There will be an extraction clinic.

Table Clinics.— It is out of all question to attempt giving the reader an outline of the different things which are to be exhibited. There are upwards of one hundred names on the list, and it would take up half the space of this journal to publish the program in detail. There will be forty chair clinics each day.

Surgical Operators.—Dr. T. W. Brophy, Chicago. Dr. M. C. Smith, Lynn, Mass. These gentlemen will take care of the major surgical operations. There are a number of others who will make the minor surgical operations.

Dr. H. R. Abbott, London, Ontario. Narcotile.

Dr. F. K. Ream, St. Louis. Nitrous Oxid and Oxygen.

Dr. F. R. Wagner, Watertown, N. Y., and Dr. P. M. Joyner, Union City, Tenn. Somnoform.

Chair Clinics.—Dr. H. W. Arthur, Pittsburg. Dr. G. T. Baker, Boston. Dr. Wm. Conrad, St. Louis. (Will operate for dentists only.) Dr. G. W. Cochran, Erie, Pa. Dr. T. J. Coe, Baldwinsville, N. Y. Dr. L. S. Chilcott, Bangor, Me. Dr. H. W. Campbell, Suffolk, Va. Dr. W. Clyde Davis, Lincoln, Neb. Dr. W. B. Dunning, N. Y. Dr. Wm. St. George Elliot, N. Y. Dr. A. G. Fee, Superior, Wis. Dr. F. Freeman, Boston. Dr. S. Freeman, N. Y. Dr. F. A. Greene, Geneva, Ohio. Dr. Joseph Head, Philadelphia. Dr. E. E. Hawley, Golden City, Mo. Dr. H. L. Howe, Boston. Dr. J. I. Hart, N. Y. Dr. V. H. Jackson, N. Y. Dr. D. O. M. Le Cron, St. Louis. Dr. T. M. Milam, Little Rock, Ark. Dr. F. L. Marshall, Boston. Dr. A. L. Midgley, Providence, R. I. Dr. A. J. McDonagh, Toronto, Ont. Dr. F. W. Proseus, Rochester, N. Y. Dr. H. B. Randall, Erie, Pa. Dr.

J. F. Ross, Toronto. Dr. J. A. Sherwood, Buffalo. Dr. F. N. Stiff, Richmond, Va. Dr. C. C. Sterrett, Kingsley, Kansas.

The Black Club.—Drs. A. C. Searl, Owatonna, Minn. H. J. Beemer, Newton, N. J. G. N. Beemer, Mason City, Ia. W. R. Clack, Clear Lake, Ia. J. V. Conzett, Dubuque, Ia. K. E. Carlson, St. Paul. A. C. Fawcett, Rochester, Minn. J. W. S. Gallagher, Winona, Minn. F. S. James, Winona, Minn. W. D. James, Tracy, Minn. A. M. Lewis, Austin, Minn. G. D. Moyer, Montevideo, Minn. J. B. Pherrin, Central City, Ia.

The following gentlemen have consented to give table clinics: Dr. George C. Ainsworth, Boston. Dr. J. F. Adams, Toronto, Ont. Dr. F. C. Brush, N. Y. Dr. G. A. Bowers, Nashua, N. H. Dr. J. A. Brown, Norrisville, Vt. Dr. J. Q. Byram, Indianapolis. Dr. C. F. Bunbury, Rochester, N. Y. Dr. J. H. Beebe, Rochester. Dr. N. A. Brounke, Mount Forest, Ont. Dr. G. T. Baker, Boston. Dr. R. M. Chase, Bethel, Vt. Dr. L. M. Cowardin, Richmond, Va. Dr. C. J. Evans, Baltimore, Dr. F. L. Fossume, N. Y. Dr. A. C. Fawcett, Rochester, Minn. Dr. C. H. Frink, Fernandina, Fla. Dr. V. H. Fredericks, St. Louis. Dr. M. L. Fay, Buffalo. Dr. C. H. Gerrish, Exeter, N. H. Dr. A. Gaiser, Davenport, Ia. Dr. C. J. Grieves, Baltimore. Dr. L. M. Homburger, N. Y. Dr. B. S. Hert, Rochester, N. Y. Dr. H. L. Howe, Boston. Dr. W. D. James, Tracy, Minn. Dr. P. M. Joyner, Union City, Tenn. Dr. J. H. Lorenz, Atlanta, Ga. Dr. Geo. A. Louque, New Orleans. Dr. S. C. Luckett, Joplin, Mo. Dr. W. H. Leake, Watertown, N. Y. Dr. F. W. Low, Buffalo. Dr. C. W. La Salle, Rochester, N. Y. Dr. F. B. Lawrence, Eldorado, Kan. Dr. O. H. Manhard, St. Louis. Dr. G. B. Mitchell, Rochester, N. Y. Dr. F. Messerschmitt, Rochester, N. Y. Dr. Grant Mitchell, Youngstown, O. Dr. A. F. Miller, Sandusky, O. Dr. J. R. Mitchell, Perth, Ont. Dr. D. J. McMillen, Kansas City, Mo. Dr. Albert L. Midgley, Providence, R. I. Dr. N. J. Mummering, Milford, Mich. Dr. F. H. Nies, Brooklyn. Dr. Alfred Owre, Minneapolis. Dr. T. W. Onderdonk, N. Y. Dr. H. M. Prettyman, Covington, Tenn. Dr. James E. Powers, Providence, R. I. Dr. S. D. Ruggles, Portsmouth, O. Dr. A. C. Rich, Saratoga Springs, N. Y. Dr. A. J. Sawyer, Manchester, N. H. Dr. L. A. Smith, Port Gibson, Miss. Dr. F. R. Sandusky, Nashville, Tenn. Dr. O. H. Simpson, Dodge City, Kan. Dr. N. A. Stanley, New Bedford, Mass. Dr. E. B. Spaulding, Detroit. Dr. A. E. Sager, Rochester, N. Y. Dr. G. A. Savage, San Francisco. Dr. L. C. Taylor, Hartford, Conn. Dr. M. C. Tracy, N. Y. Dr. J. C. Watkins, Winston-Salem, N. C. Dr. F. Westerfield, St. Charles, Mo. Dr. W. A. White, Phelps, N. Y. Dr. J. H. Worthen, Concord, N. H.

This comprises a complete list of the clinicians so far obtained. I shall not hear from the rest of the men on the Committee until the 20th of July, and therefore a number of names are omitted which at present are either in transit or else have not been received. A number of the Committee have written that they have finished their list, but so far it has not reached me. I would like to send a complete program for the consideration of your readers, but this it is out of all question to do at the present time.

The clinics will be held in the College Infirmary of the University of

Buffalo, Dental Department, 27 Goodrich Street. The operations will begin at 9 a. m. on both Wednesday and Thursday mornings, July 26 and 27. As was stated in the last announcement, there is every indication that the forty chairs will have an operator at each of them on both days.

The thanks of the entire profession are due to the members on the Committee and also to Dr. F. W. Gethro, Chicago; Dr. T. P. Hinman, Atlanta, Ga., and Dr. S. H. Voyles, St. Louis. These three gentlemen have rendered an excellent account of themselves in the work of assisting me toward obtaining clinicians.

E. K. WEDELSTAEDT, Secy., N. Y. Life Bldg., St. Paul.

LATEST DENTAL PATENTS.

787,350. Shaft attachment for dental motors, Wm. B. and E. P. Alford, Sumter, S. C.
787,352. Artificial tooth, Colin T. Campbell, Kentville, Canada.
787,584. Dental furnace, Arthur E. Matteson, Chicago.
787,826. Dental flask, George L. Bruce, Baltimore.
787,861. Apparatus for straightening teeth, Willard B. Shelp, St. Louis.
787,937. Operative dental instrument, Frederick L. Norton, Bath, Maine.
787,947. Dental pliers for shaping clasps and half-collar crowns, Roderick M. Sanger, East Orange, N. J.
788,398. Extracting tool, John B. Fladby, Rutland, N. D.
788,490. Apparatus for swaging dental plates, Carl L. Nelson, Seattle, Wash.
788,906. Excavating bur for dentists, Willy Homann, Dusseldorf, Germany.
788,909. Dental scraper, James W. Ivory, Philadelphia.
788,947. Device for removing obstructions from between the teeth, Charles F. Roth, Chicago.
788,981. Dental disk-shield, Wm. F. Green, Modesto, Cal.
789,032. Centering device for flask patterns, George W. Jones, Gate City, Ala.
789,161. Dental electrode for medicamental diffusion, Samuel H. Linn, Rochester, N. Y.
789,415. Dental device, Henry G. Dressel, Chicago.
789,591. Dental appliance, Freeman Davis, Moulton, Iowa.
789,908. Dental cup, Wm. Hare, Augusta, Ill.
790,207. Dental bracket, Gustav Holtz, Gouldsboro, Pa.
791,456. Artificial tooth, Frank R. Denton, Denton, Neb.
791,563. Rubber-dam holder, Roscoe F. Ludwig, Chicago.
791,641. Tooth-crown, Isaac W. McClanahan, Friend, Neb.
791,668. Prophylactic dental appliance, Frederick H. Apel, Athol Springs, and S. A. Merkley, Buffalo, N. Y.
791,730. Electrical mouth bath, Johan J. Stanger, Ulm, Germany.
791,859. Dental separator and tooth holder, Elias D. Barnes, Enfield, N. C.
792,438. Dental matrix retainer, Wm. W. Minch, Philadelphia.
792,471. Toothpick, James L. Smith, Princeton, Indiana.

News Summary.

S. M. BURNHAM, a dentist of Madison, Wis., died May 26, 1905.

J. M. GLENN, a dentist of Cayneville, Ky., died suddenly June 1, 1905.

C. B. DEZELL, a dentist of Wabasha, Minn., died suddenly June 1, 1905.

W. W. PAFFORD, a dentist of Valliant, I. T., died of hydrophobia, June 1, 1905.

L. C. EDISON, a dentist of Fergus Falls, Minn., died of pneumonia, June 3, 1905.

F. B. NESBETT, 63 years old, a dentist of New Bedford, Mass., died June 15, 1905.

PERRIN H. CALDWELL, 78 years old, formerly a dentist of Akron, O., died June 8, 1905.

HENRY C. RICHARDS, a dentist of Westport, Nova Scotia, died suddenly June 10, 1905.

BYRON D. PALMER, 50 years old, a dentist of Bryan, O., has become mentally deranged.

HENRY S. BEACH, 32 years old, a dealer in dental supplies, died June 3, 1905, at Brooklyn.

S. S. MATHERS, a dentist of Columbus, O., for 30 years, died suddenly of paralysis June 19, 1905.

R. F. HORNE, 61 years old, a dentist of Watertown, Mass., died June 7, 1905, after a short illness.

HENRY E. MANN, 76 years old, a dentist of New Bedford, Mass., died of heart disease June 19, 1905.

WILLIAM MCA. HENDRIE, 27 years old, a dentist of Paterson, N. J., died of Bright's disease June 19, 1905.

M. C. SHEEHAN, 47 years old, a dentist of Detroit, Mich., died June 10, 1905, from rheumatism of the heart.

THOMAS W. BLANTON, a dentist of Cleveland, was recently made insane from grief over the death of a brother.

REMOVAL OF INLAY MATRIX.—The gold matrix may be easily and thoroughly removed from the inlay by immersing it in aqua regia (nitro-hydrochloric acid) for twenty or thirty minutes.—D. W. BARKER, *Summary.*

SALIVA.—Sticky, ropy saliva causes particles to adhere to the teeth, which can be removed only by hard friction and pumice. This friction also creates a healthy stimulus to the gums, stirring up the stagnant glands and producing a more healthy flow of saliva.—D. M. CATTELL, *Review.*

TALCUM FOR THE HANDS OF OPERATORS.—Violet talcum powder in small quantity is useful to dry the hands after washing, and serves the double purpose of giving a pleasant odor to the hands and in winter helping to prevent the chapping due to frequent washing.—GRAFTON MUNROE, in *Review.*

ACCORDING TO ORDERS.—Exacting Customer—Are you sure you've got that medicine mixed right?

Druggist.—No, I ain't; but I've got it mixed the way the doctor ordered it.—*Med. Standard.*

LIMITED.—The greatest objection to saying what you think is that there may not be enough of it to sustain the conversation.

PERVERTED PROVERB.—Oily to bed and oily to rise
Is the fate of a man when an auto he buys.—*Life.*

YOUR PROFESSION.—Regard it not merely as a means of making a living, but first of all as a means of making a life—a larger, nobler specimen of manhood.—*Success.*

MUCH DECIMATED.—Canal, Jan. 6.—We are having an epidemic of scarlet fever and scarlatina. Several of our schools are very much decimated.—*Franklin* (Ky.) *News.*

NO GAS.—Mistress (to Mary, who has just had a tooth taken out at the Dental College): "Did they give you gas?" Mary: "Oh, no, marm! The young man was most polite."

THE HYPODERMIC SYRINGE.—Use thin lead washer in the needle point of your hypodermic syringe; it will make a water-tight and aseptic joint, and does not have to be removed for a long time.—*Hints.*

MIRROR PROTECTION.—Place a moistened microscopic cover-glass upon the mouth-mirror. If the stone should mar it, it can easily be replaced, thus saving your mirror many a scratch.—*Elliott's Quarterly.*

HERE'S LUCK TO LUKE.—According to the Rock Valley, Ia., *Bee,* "Luke ——— of the ——— Dental School of Chicago is home for the summer vacation. Ere many moons Luke will be ready to sharpen teeth and fill as well as pull them."

CARE IN ADJUSTING BANDS.—Driving bands down too far and too tightly on roots is responsible for the exfoliation of many crowned roots. We should avoid all possible irritation in our operations.—MARK G. MCELHINNEY, in *Review.*

RETAINING POINT IN BACK OF INLAY.—Make a small hole in the back of the inlay before baking and fill it with investing silex. After baking, remove the silex, leaving a hole which serves as retaining point when cementing to place.—C. RIPPON, *Record.*

PHYSICAL CONTACT.—We should restrict physical contact to the smallest possible limit. To lean on a patient is altogether unnecessary, and to rest one's elbow on a lady patient is unpardonable vulgarity.—MARK G. MCELHINNEY, in *Review.*

DAMAGE SUITS.—A dentist in New York City was sued last month for $10,000 damages by a man who alleges that the dentist did not properly treat a broken jaw, and thereby subjected the plaintiff to great pain, expense and loss of time.—This month a man in Buffalo brought suit against a dental college on behalf of his son, a minor, alleging that he was poisoned by dirty dental tools and has suffered greatly thereby.

DIFFICULT EXTRACTION.—After a difficult extraction the wound will require daily syringing with dioxogen until granulations have filled the cavity, and even then the patient should be instructed to use constantly an antiseptic mouth wash.—L. G. NOEL, *Headlight.*

AN IMPRESSIVE MANNER.—"Dr. Jones always seemed to be very earnest, at any rate."

"Oh, very! Why, he can say, 'How are you?' and give you the impression that he really wants to know."

LOSES FILLING AND FINDS PEARL.—This month while eating clams at a Chicago hotel a man bit upon a hard subsance and broke off an inlay and part of a tooth. He did not sue the management for damages, however, as the hard substance was a valuable pearl in the clam.

ANESTHETIC REQUESTED.—One day as a certain schoolmaster, with aspect fierce and cane upraised, was about to punish one of his pupils, the little fellow said, quite innocently and doubtless with some vague recollection of a visit to the dentist's: "Please, sir, may—may I have gas?"

FIRES.—J. C. Dugan, Tuscola, Ill., June 2, loss $500, insurance $300.—Dr. Slater, Johnson City, Ill., June 16, loss $200.—J. A. Cotton, Bosworth, Mo., June 1, total loss.—Charles Fox, Brooklyn, May 16, loss $50.—Dr. Harrill, La Follette, Tenn., June 15, instruments and books, total loss.

ARGYROL.—For inflamed gums try the crystals of argyrol. It is non-escharotic and is absorbed with exceeding rapidity by the tissues. A few crystals will soon color the entire mouth, but the stain is only temporary and the congested condition will be greatly improved after the application.—E. D., in *Review.*

REPAIRING PLASTER CASTS.—Plaster casts may be repaired by the use of celluloid dissolved in camphor and ether, equal parts. Keep the creamy mixture tightly corked to prevent evaporation. Free both surfaces from all loose particles, and coat with the solution, pressing firmly to place.—S. M. WEEKS, *Cosmos.*

DECIDUOUS FILLING.—One of our subscribers states that he recently received the following note from a woman patient: "I have one front tooth that wants filling bad. Now I am nursing a child. Do you think it would hurt to fill it? If not, please let me know when you can do it." Our correspondent states that he filled the tooth only.

LUBRICATING OIL.—To prevent the spreading of lubricating oil cut slips of blotting paper, and after lubricating bearings, joints, etc., apply a slip and so absorb the superfluous oil. The slips can be inserted in places difficult to reach with a rag and with no liability of fluff or threads getting into the mechanism.—TIVERTON, *Elliott's Quarterly.*

EXTRACTING FIRST BICUSPID ROOTS.—When it becomes necessary to extract a first bicuspid root much care should be taken, as frequently we find that the apical end of the lingual root is frail and crooked. A root of this kind can almost always be removed without fracturing by moving the forceps buccally, and not rotating, as is too frequently done.—*Review.*

IDENTIFIED BY HIS TEETH.—This month a man suffered a stroke of apoplexy while on a train near Philadelphia. He was taken to one of the city hospitals, and the only clue to his identity were several prominent gold teeth and a telephone number in a notebook. The hospital authorities rang up that number and mentioned the teeth, and in this way the man was identified.

PULP CONSERVATION.—If a layer of firm dentin is formed between the bottom of the cavity and the pulp tissue, and the pulp rallies promptly from paroxysms of pain produced by thermal shock, even though the paroxysms be severe, it is evidence of tonicity and recuperative power; then the chances of restoring the pulp to health are good.—F. G. WORTHLY, *Western.*

BENCH APRON.—If you use a Moore spring apron, cut off the wrists of an old pair of gloves having snap fasteners, cut each wrist in two, nail two parts to the laboratory bench and sew the opposite parts to the lower corner of the apron. This forms a sack which will catch anything that may drop, and the apron can be freed from the bench at any time.—*A. E. Kellogg,* Cresco, Ia.

IODIN TREATMENT OF SUPPURATION.—The tincture of iodin applied locally is one of the most efficient drugs for the treatment of suppuration. The author asserts that after one or two applications of iodin to an infected and discharging wound the pus will almost entirely disappear and the wound will be practically dry. In surgical tuberculosis favorable results are to be anticipated.—W. S. PUGH, JR., *Amer. Med.*

DECIDUOUS TEETH.—When conditions make it necessary to remove the deciduous teeth before the time for their successors to erupt, the space should always be preserved, and I know of no better way than that suggested by Dr. Angle—to use a piece of German silver wire, placed in a pit in each adjoining tooth, which may be tightened by stretching with a pair of pliers.—W. O. TALBOT, *Headlight.*

FILLINGS WITH ALTERNATE LAYERS OF COHESIVE AND NON-COHESIVE GOLD.—Cohesive and non-cohesive gold I use in combination to advantage by placing a layer of the non-cohesive gold on the cavity margins and covering it with a layer of cohesive foil. By placing it in alternate layers a hard filling is made, and at the same time one the adaptation of which to the cavity walls is more perfect.—J. F. STEPHAN, *Summary.*

ILLEGAL PRACTITIONERS.—June 8, a man at Altaville, Cal., was fined $50 for practising dentistry without a license.—June 19, a man at Los Angeles paid a fine of $50 for practising dentistry without a license.—June 7, five dentists at Sacramento were arrested for practising without a license.—Last month a man at Santa Cruz, Cal., was fined $50 for practising dentistry without a license.—June 9, two dentists at Rock Island were each fined $25 and costs for practising without a license, and similar charges were filed against three other men of the same town.—June 7, a dentist in New York was arrested for practising without a license.—June 17, a traveling dentist, who pulled teeth in a tent and gave a little vaudeville entertainment, was arrested at Lorain, O., for practising dentistry without a license.

OIL STONE, RESURFACING.—Resurfacing a stone is necessary whenever any concavity of the surface or other defacement is observable. A coarse grade of emery or sandpaper secured on a flat surface, the stone used as a plane, reproduces the surface, using the finest grades of emery or sandpaper for the finishing. The stone should be clean and free from oil previous to resurfacing.—B. BANNISTER, *Summary.*

BANKRUPTS.—Albert M. Johnston, a dentist of New York City, was granted a discharge in bankruptcy June 12, with liabilities of $3,828.—Chas. E. Summers, a dentist of Milwaukee, filed a petition in bankruptcy June 10, giving his assets as $455 and his liabilities as $1,696.—Albert Westlake, a dentist of New York City, filed a petition in bankruptcy June 16, giving his unsecured liabilities as $45,814, and nominal assets.

LIZ'N.—George held her hand and she held hiz'n,
And then they hugged and went to kiz'n,
They didn't know her pa had riz'n
Madder'n hops and simply siz'n,
And really tis'n right to liz'n,
But George got hiz'n and went out whiz'n.

PROXIMAL CAVITIES; THE GINGIVAL SEAT.—A flat gingival seat is not only advisable, but it is absolutely necessary in proximal cavities in bicuspids and molars subjected to normal occlusal stress. It not only adds largely to the stability of the filling, but enters very materially into the convenience, form and method of extension for prevention at the gingivo-lingual and labial angles which are most prone to recurrence of decay.—J. F. WALLACE, *Era.*

HAPPY COMPROMISE.—J. T. Trowbridge in the *Atlantic Monthly* tells an anecdote of Oliver Wendell Holmes, typical of his keen wit. When the friends of the rival claimants of the discovery of anesthesia were proposing monuments for each, Holmes suggested the erection of a single memorial, with a central group symbolizing painless surgery, a statue of Jackson on one side, a statue of Morton on the other, and the inscription underneath: "To E(i)ther."

KNIFING HIM.—An Ohio man who was recently elected to Congress went to Washington to look around and see what his duties were. He was hospitably received, and was wined and dined a great many times by his colleagues. Before he went home he said to his friends: "By George, I have had a good time! I have had dinners and breakfasts and suppers galore given to me. In fact, I haven't had my knife out of my mouth since I struck town."—*Argonaut.*

AGAIN THE ADVERTISING QUACK.—About four months ago two smooth young fellows landed in Baraboo, Wis., and opened an advertising dental office. They recently left town, and also left a number of unpaid bills, a great many cases of poor dental work, and several people who had paid in advance for work which is uncompleted. The newspapers of the town are now trying to explain why they carried the advertisements of these quacks, and although somewhat late, are advising readers to avoid traveling dentists and to patronize only resident practitioners.

ORTHODONTIC APPLIANCES.—The requisite qualifications in orthodontic appliances are efficiency, simplicity, delicacy and inconspicuousness. *Efficiency* should receive the first consideration; *simplicity* is next in importance; *delicacy* applies to the proportions. The freer the appliance is from bulk the less it will interfere with the functions of the mouth, the danger of caries will be diminished, and the less will be the annoyance to the patient.—ROLOF B. STANLEY, *Cosmos.*

NO ARGUMENT.—A fellow practitioner who occasionally has spells of philosophising, closed his part of a little discussion with the managing editor of a great daily with the remark: "I'd rather die a couple years too early than an hour too late." "I don't quite catch on." "Why, an hour too late would give me more than time enough to make a damphool of myself." "That's no argument," promptly replied the editor, "I make a damphool of myself every day."—*D. O. & Lab.*

TO CLEAN A HANDPIECE QUICKLY.—Take a common glass tube, such as gold cylinders are contained in, and fit a good cork tightly into it. Keep a sufficient quantity of kerosene oil in the tube to cover the handpiece when placed in it. When the handpiece becomes sticky and the bearings rusted, plunge it into the tube of oil and run the engine rapidly for a short time. A second bath will rarely be necessary to cleanse the bearings in preparation for a little suitable oil.—H. DARLING, *Review.*

ACCIDENTS.—Joseph C. Frey, formerly in the practice of dentistry in Rock Island, Ill., and now in Chicago, had his left foot cut off by a train June 21.—June 12, a vulcanizer exploded in the office of J. D. Ford at Findlay, O. Some damage was done to the office, but no one was injured.—June 20, a woman at Whitewater, Wis., was struck by lightning and an upper set of false teeth was broken and knocked from her mouth by the shock.—June 5, a man in Chicago while asleep swallowed a plate carrying two false teeth. Fortunately it stuck in his throat and was extracted at a hospital nine hours later.

OLD-TIME DENTISTRY.—A story was recently told of the elder Judge Peckham, father of the justice. In the early days of dentistry a hickory plug was put into the cavity to fill the space where a tooth ought to be. This plug had to be gently pounded into its desired position. The old judge was somewhat addicted to strong language, and when the dentist began his work the judge indulged in some classic comment. As the tapping of the plug continued he threw all dignity to the four winds of heaven, and his language became decidedly "more forcible than elegant." When, however, he arose from the chair, after what seemed to him an interminable period of agony, he pulled out all the stops in his vocabulary for a grand climax. The impression on his listener seems to have been deep and lasting. As the judge passed out the dentist grimly remarked to a waiting patient: "Wasn't it beautiful? It wasn't really necessary to pound half as long, but I did so enjoy his inflection that I almost pounded the hickory plug into splinters. Wonderful command of language the judge has!"—*National Magazine.*

DIVORCES.—June 29, Mrs. Emma J. Borland secured a divorce from her husband, Thomas J. Borland, a dentist, of Milwaukee.—June 2, Mrs. Daisy Carmichael brought suit for divorce against her husband, George J. Carmichael, a dentist, of Milwaukee.—Last month G. B. Husted, a dentist of Modesto, Cal., brought suit for divorce against his wife.—Frank H. Newton, a dentist of Atchison, Kan., has brought suit for divorce against his wife, alleging desertion.—Mrs. Terra Del Whipple on June 10 brought suit for divorce against her husband, J. A. Whipple, a dentist, of Chicago, alleging desertion.

APPOINTMENTS.—I would strongly recommend that every dentist who can should educate his patients to understand that he works by appointment, even though he knows he cannot carry out this plan to anything like an exclusive length. His time is thus filled more evenly, he obviates the risk of being hurried over his work, he shows that he considers his time of great value, and his patients will gradually absorb the same idea, and no patient who calls without appointment will have legitimate cause for complaint if he has occasion to absent himself from his office.—"A WORKER," *British Journal Dental Science.*

SPRAYING THE DENTAL OFFICE WITH AROMATIC SOLUTIONS.—Not infrequently our operating rooms have peculiar "dental odors" about them. Iodoform, carbolic acid, oils of cassia, cloves, and other essential oils and highly volatile substances add in the mind of many sensitive patients still more repugnance to the office than they already feel from fear. It is my habit to spray the room with a weak solution of spirits of lavender—fumigate, so to speak, the entire breadth and length of the operating room. Compressed air does this admirably, and the room smells sweet and fresh and the air is far more agreeable.—GEO. ZEDERBAUM.

ANCIENT MEDICAL ADVICE.—The following advice, which is being printed in various lay newspapers, is said to have been given by Rhazes, an Arabian physician, to his patients more than one thousand years ago: "Study carefully the antecedents of the man to whose care you propose to confide all you hold most dear in the world—that is, your life and the lives of your wife and children. If the man be dissipated, given to frivolous pleasures, cultivates with too much zeal the arts foreign to his profession, and still more if he be addicted to wine and debauchery, refrain from committing into such hands lives so precious."—*Jour. Amer. Med. Assn.*

DAMAGES GIVEN FOR TOOTH SWALLOWED UNDER GAS.—Some nineteen months ago a woman went to an advertising dentist in Los Angeles and had several teeth extracted under gas. When she regained consciousness she coughed and felt as though she were choking. The cough continued for months and she became a confirmed invalid. Last August she coughed up the root of a molar tooth, and on ascertaining that this was the cause of her illness she brought suit against the dentist. Last month she was given judgment against him for $2,400 and costs in the Superior Court, the judge deciding that the dentist was negligent and should have made sure that he removed all the teeth and their roots.

SEPTIC BLOOD IN PYORRHEA ALVEOLARIS.—By Robert L. Watkins. The author (*Items of Interest*) has observed that in advanced stages of pyorrhea there is the same appearance in the blood—in a less degree—as that which he has observed in puerperal fever and advanced carcinoma—a septic blood condition. This also occurs in certain forms of tuberculosis when there is pus formation; in chronic meningitis, scrofula, pyemia, epithelioma, severe phlegmon, gangrene, septic osteomyelitis, septic polyarthritis, ulcerative endocarditis, phlegmonous erysipelas, advanced cases of phthisis, alcoholism, or any condition in which pus may find its way into the circulation.

KNEW WHAT SHE WANTED.—Once there was a lady in a bargain-day crush, and she fainted. The floor-walker looked first at her white face, then at her dainty feet kicking, and he was a bit scared—he feared he might be made accessory after the fact, "particeps criminis" or something. So he hastily told the clerk at the ribbon counter to telephone for Dr. Jackanapes—"and tell him to come in his automobile and come quick!"

The lady ceased to kick, opened her mild, blue eyes, and then her ruby lips, and petulantly said—"Don't send for an automobile doctor—I will not see him—I will not—send for a horse doctor!"—*Philistine.*

GOLD INLAYS.—In building and contouring gold inlays I am in the habit of using twenty-two carat gold; clippings from crown-work may be used to good advantage. Cut in sizes and shapes to suit the case in hand, having each piece fluxed, adjusting small pieces in the deeper depressions, placing successively larger pieces until finally one or more pieces extending from margin to margin may be adjusted; rounded contour may also be built up, filling in and covering this framework or skeleton with twenty-two carat solder, distributing the pieces of solder so as to permit free flowing under and around the pieces of gold plate.—C. H. WRIGHT, *Review.*

BUSINESSLIKE IF NOT PROFESSIONAL.—A young dentist recently identified himself with a Milwaukee church that claimed a wealthy congregation. He was very anxious to be of service, and was finally asked to pass the collection box. The minister noted that each Sunday the young man handed each person something while passing the box, but supposed it was the envelopes in which the money was to be placed. After a few Sundays of unprecedented activity on the part of the young dentist an investigation was made, and it was discovered that he was handing out his business cards. We understand that the young man is now attending another church.

ROBBERIES.—R. L. H. Turner, Los Angeles, Cal., May 28, several gold crowns and some gold.—W. E. Holmes, New Haven, Conn., June 3, some gold.—George L. True, Cambridge, Mass., June 8, some gold.—A. L. Button, Saginaw, Mich., June 16, a few dollars' worth of false teeth.—Carl E. Smith, Akron, O., May 16, gold fillings and gold ring valued at $50.—A. L. Beatie, George Hoeye, L. A. Morris and F. Freeman, all of Oregon City, Ore., total loss $200.—Drs. Alexander, Phillips, Ball and Black, Modern Dental Parlors, New York Dental Parlors, Dr. Brown, Seattle, Wash., total loss, $200. The thief gained entrance through the transom in each case.

EXAMINING BOARD AFFAIRS.—The California Board is again having trouble, as two of the members have preferred charges of misconduct against the other five.—At the June meeting of the Colorado Board the following officers were elected: President, W. H. Sutherland, Denver; Secretary, R. McGee, Denver; Treasurer, J. D. Hopper, Trinidad.—At the last meeting of the Minnesota Board eleven applicants were successful in passing the examination.—At the last meeting of the Washington Board 20 applicants successfully passed the examination. The following officers were elected: President, W. A. Fishburn, Ellensburg; Secretary, C. S. Irwin.—May 29, the Wyoming Board was organized and the following officers were elected: President, Wm. Freckelton, Sheridan; Secretary, P. Appel, Cheyenne; Treasurer, W. C. Cunnington, Evanston.

PROSTHETIC APPLIANCES AND THE DENTAL LABORATORY.—It is surprising what meager and old worn-out appliances some good dentists are content to work with. I recently visited an office which reminded one of a junk-shop more than a dental laboratory. It contained almost everything from a worn-out bird-cage to a static electric machine, except that the dental appliances were few and badly worn out. The old foot lathe was so much worn that it rattled badly. A battered vulcanizer and a few worn-out files and scrapers were practically all the tools visible. There was dust and dirt everywhere. It was a poor place for sociability and its occupant was not notorious as a sociable person. It is not necessary that our laboratories should be filled with all manner of devices, however useful they may be on occasions, but enough well-selected and up-to-date appliances necessary to do modern work should be found in every well-regulated laboratory.—N. S. HOFF.

BANDLESS CROWNS.—Don't use bands! Now I do not ask you to take my word for this, but I ask you to watch your bands; that is all. There is more devilment done, more mischief, by the setting or undertaking to set porcelain crowns with bands than any other one thing in dentistry—did you know that? Therefore use as few bands as possible. Why? Because a band does not do any good; it does not strengthen the crown, and if it did I would not want it anyway, because I obtain all the strength I want without the band. A band is put on for the purpose of hiding a joint. You make a bad joint and put on a band to hide it. All I ask you to do is to watch and make notes of what you see in the way of setting of band crowns. I do not mean by this that we must not use gold crowns in the back of the mouth. Use them if you want to, and fit them as accurately as possible. You never did get one fitted accurately, and you never will.—D. J. MCMILLAN, *Summary.*

AN IDEAL DENTAL LABORATORY.—The location of the laboratory should be among the first things decided upon in arranging the office. The proper place for this room is to the right of the operating room, and it should be at least twelve by fifteen feet in size. A room of this size may seem to some to be far too large for convenience, but when it is remembered that one has to spend hours in this room, we can readily see that it is if anything too small for good hygienic conditions. The work to be done at the different

benches will require different sets of tools and appliances, and can be spread around a good-sized room and still be very convenient. This room should be well supplied with light which comes in through at least two large windows at the front. I wish especially to call your attention to this point, as I have seen so many laboratories tucked away in a little dark hole, where it is simply impossible for any man to do that fine work which is required of us.—CHAS. H. WORBOYS.

ACCURATE PLASTER CASTS IN THE STUDY OF DENTAL IRREGULARITIES.—The first essential for the consideration of any case of irregularity is to procure as perfect a cast from plaster impressions as possible. More than any other detail in orthodontia does an accurate model mark the dividing line between the artist and the amateur. Having procured such a cast, and also a somewhat general history of the case, including such data as the full name and age of the patient, we are prepared for a more or less detailed study of its etiology. Among the many factors now known to be operative in the causation of the various types of irregularity there can be none of greater interest to the dental practitioner than those grouped as "local causes." A study of this group very forcibly emphasizes the necessity of avoiding the early loss of deciduous teeth, as evidenced by the disastrous results which generally follow, and their mischievous influence upon erupting permanent teeth, should they persist long after the need which occasioned them has ceased.—BENNO E. LISCHER, *Era.*

POTENTIAL TREATMENT OF THE MANIFESTATIONS OF FAULTY ERUPTION OF THE THIRD MOLAR AND OF APHTHÆ.—BY PIERRE ROBIN (*Rev. de Stom*). The author reported in 1902 the result of pyorrheal treatment with Nordhausen sulfuric acid. The same method he has followed in treatment of accidents caused by the pathologic eruption of the third molar, such as pain, trismus, etc., likewise in the treatment of aphthæ. The application of this potent cautery upon aphthous patches has caused their disappearance in a short time. The author reports a case of aphthous fever in which the treatment here advocated brought about a cure within a week. In the treatment of gingival and buccal inflammation due to the pathologic eruption of the third molar the careful application of the acid decreases the pain and reduces the inflammation. This method is claimed to be less painful and easier to carry out than the customary one, which consists in deep lancing of the overlying gum flap. The precautions to be observed whenever caustic agents are made use of within the mouth must be rigorously adhered to when applying Nordhausen sulfuric acid. It is a violent caustic and its action should be limited to a definite area.

CITY DENTISTS OF GERMANY.—Municipal dentists are appointed and paid for by many of the large towns and cities of Germany. The method of work is simple. The teacher brings his class to the dentist, who examines each mouth quickly and marks on the card each child has brought whether treatment is necessary. If so, the child must come again on a Saturday. Russia is also joining in this movement, and has already fitted up nine such institutions in St. Petersburg alone. And why not? or rather, why so late in coming? one might ask. If it is true that, generally speaking, good teeth are

necessary to good health and long life, and if, also, a large and growing proportion of citizens have not good teeth, then it follows that the fact is of public concern. It is not, for instance, of so much importance to the community that workmen should have good masticating and digestive powers as that there would be $20,000,000 city halls, public banks, expositions, etc. This little or large realization of preventive medicine has so far got into our American minds that we have ordered the soldier's teeth to be attended to and his governmental service by so much enhanced. But the soldier is at last paid by the civil worker, and as to his teeth and service we are entirely indifferent.—*Brooklyn Citizen.*

LARGE PORCELAIN RESTORATIONS. NEW METHOD.—By G. S. Hershey, D.D.S., Michigan City, Ind. Prepare cavity as usual for porcelain and in making matrix be sure to anneal well if platinum foil is used. Paint walls of matrix with a solution of shellac, leaving floor free if an approximal cavity. Let dry and fill with foundation body to about the contour desired, leaving room of course for the enamel bodies of the desired shades. Bake as usual without any of the precautions taken heretofore, such as the cutting of grooves, inserting pieces of very high-fusing porcelain, etc. On removal from furnace you will find a crevice between matrix and porcelain. Now fill crevice with enamel bodies of the desired shades and finish as usual. The porcelain adheres only where the matrix is free from shellac. If the shellac is used correctly it makes it impossible for the porcelain to pull the matrix. It can be used with success in large restorations in the anterior teeth by painting the labial half and cervical third. This helps to preserve the contour by the shrinking of the porcelain away from the matrix instead of toward it. Then fill with enamel body the crevice and the labial portion, which has been cut away for shading. Finish as usual. The shellac burns out at a very low heat and has no effect on the porcelain whatever. To produce a clear solution, take a two-ounce bottle half full of powdered shellac, fill with alcohol and shake well. Let it stand until thoroughly clear on top, then pour off into small bottle for immediate use. The large bottle may be filled with alcohol and put aside for future use in same manner.

MARRIAGES.—Ernest E. Argetsinger, a dentist of Pipestone, Minn., was married to Miss Anna Deem of Ohio, June 15.—William F. Baker, a dentist of Harrisburg, Pa., was married to Miss Mayme Shay of Lebanon, June 7.—Delbert Bennett, a dentist of Bessemer, Mich., was married to Miss Rose McCann of Detroit, June 7.—Charles W. Berry, a dentist of Somerville, Mass., was married to Mrs. Louise Webber Markham Norcross, June 3.—Adolph F. Brunow, a dentist of Seymour, Ind., was married to Miss Martha A. Droege of Seymour, June 1.—N. L. Burke, a dentist of Benton Harbor, Mich., was married to Miss Ada Burke of Benton Harbor, June 1.—Charles F. Cavanaugh, a dentist of San Francisco, was married to Miss Florence Wyatt of San Francisco, June 7.—F. M. Cole, a dentist recently located in Cuba, was married to Miss Veva Robertson of St. Louis, June 1.—Samuel Corle, a dentist of Wildwood, N. J., was married to Miss Marie Dever of Philadelphia, June 12.—Everett Crume, a dentist of Hillsdale, Mich., was married to Miss Hazel Harwood of Hillsdale, June 15.—S. J. Cunningham, a

dentist of Syracuse, Ind., was married to Miss Ora Shoemaker of Huntington, May 24, 1903, and it has just been announced.—E. A. Doan, a dentist of Mishawaka, Ind., was married to Dr. Anna Adel Barron of South Bend, Ind., June 20.—John K. Eyler, a dentist of Kittaning, Pa., was married to Miss Eva Plank of Kittaning, June 14.—M. E. Eby, a dentist of Hartington, Neb., was married to Miss Edna Taylor of Sioux City, Ia., June 21.—Dr. Fallis, a dentist of Cassville, Wis., was married to Miss Mame Pryor of Fennimore, June 15.—Carleton A. Fletcher, a dentist of Baldwinville, Mass., was married to Miss Hattie B. Leland of Baldwinville, June 20.—L. A. Jones, a dentist of Alton, Ill., was married to Miss Eva May McElhiney of Upper Alton, June 1.—T. S. Johnson, a dentist of Wausau, Wis., was married to Miss Marie Nichoff of Horicon Junction, Wis., June 13.—Ralph Kestley, a dentist of Milwaukee, Wis., was married to Miss Dora Wikowski of Milwaukee, June 8.—Calvin W. Knowles, a dentist of San Francisco, was married to Miss Cornelia Curtis of San Francisco, June 7.—Christian Luetze, a dentist of St. Louis, was married to Miss Hedwig Dose of Belleville, Ill., May 27.—Leonidas I. Lutton, a dentist of Detroit, Mich., was married to Miss Susan Pavey of St. Thomas, Ont., June 21.—Charles D. McBean, a dentist of Pendleton, Ore., was married to Miss Ruby Pearl Rice of Spokane, Wash., June 9.—William E. Maguire, a dentist of Springfield, Mass., was married to Miss Molly Dunn of Round Hill, Mass., June 22.—Elwood J. Miller, a dentist of St. Louis, was married to Miss Hallie Bearce Patton of Macon, Mo., June 1.—J. R. McCormick, a dentist of Xenia, O., was married to Miss Stella Kershner of Trebeins, O., June 21.—Roy Millman, a dentist of Dayton, O., was married to Miss Lida Shaffer of Middletown, O., June 8.—Shelley B. Osborne, a dentist of Hopedale, Mass., was married to Miss Anna Elizabeth Threlfall of Newton Highlands, Mass., June 14.—C. A. Putnam, a dentist of Easthampton, Mass., was married to Miss Gertrude C. Brown of Palmer, Mass., June 7.—J. G. Peterson, a dentist of Zanesville, O., was married to Miss Wilma C. Carson of Cambridge, June 1.—J. A. Rockfellow, a dentist of Chicago, was married to Miss Amanda Wilucki of Marissa, Ill., June 5.—Ralph B. Sheier, a dentist of San Francisco, was married to Miss Libby Aronson of San Francisco, May 23.—Fred B. Smales, a dentist of Keokuk, Ia., was married to Miss Mary Alice Warwick of Keokuk, June 15.—Byron A. Smith, a dentist of Champaign, Ill., was married to Miss Mary Heffernan of Champaign, June 15.—W. W. Stallworth, a dentist of Fayette, Ala., was married to Miss Ruth Plant of Birmingham, Ala., June 1.—H. H. Thacker, a dentist of Brazil, Ind., was married to Miss May Gonter of Brazil, June 14.—James M. Thompson, a dentist of Chicago, was married to Miss Ida M. Reed of Galena, Ill., June 12.—L. J. Tourtellott, a dentist of Anamosa, Ia., was married to Miss Blanche R. Johnson of Enid, Okla., June 23.—Edgar D. Urich, a dentist of Bethlehem, Pa., was married to Miss Helen Hoffman of South Bethlehem, May 20.—G. W. Vail, a dentist of Iowa City, was married to Miss Lena Wood of Mankato, Minn., June 10.—T. F. Wait, a dentist of Storm Lake, Ia., was married to Miss Florence Banner of Storm Lake, May 24.—Robert H. White, a dentist of Frankton, Ind., was married to Miss Gertrude Wild of Indianapolis, June 17.